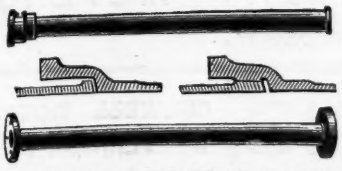
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXI. No. 1810.] LONDON, JANUARY 18, 1898. [50TH YEAR. PRICE 6d.

GAS AND WATER PIPES

1¼ to 12 IN. BORE.



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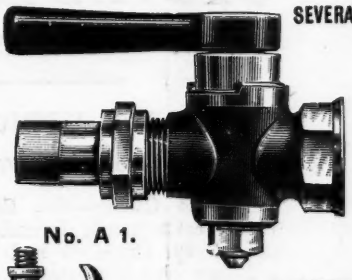

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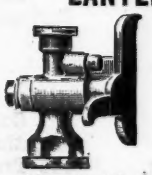

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No. A 11.

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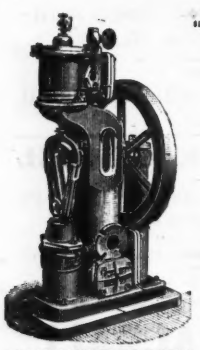

Fig. 706. "SINGLE RAM" STEAM-PUMP.

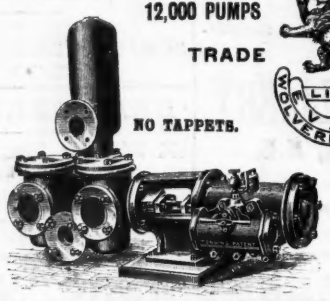

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

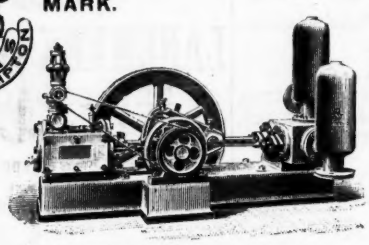

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

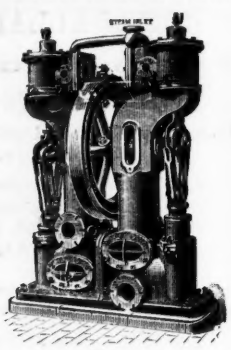

Fig. 712 "DOUBLE-RAM" STEAM-PUMP.

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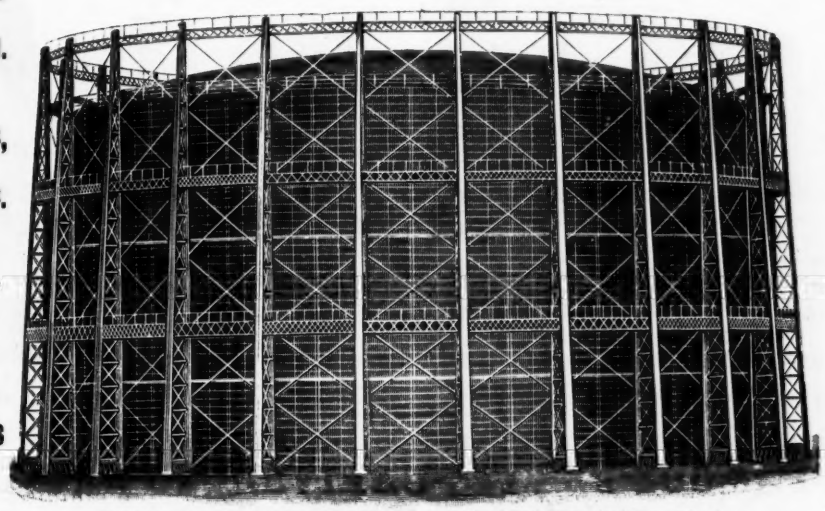

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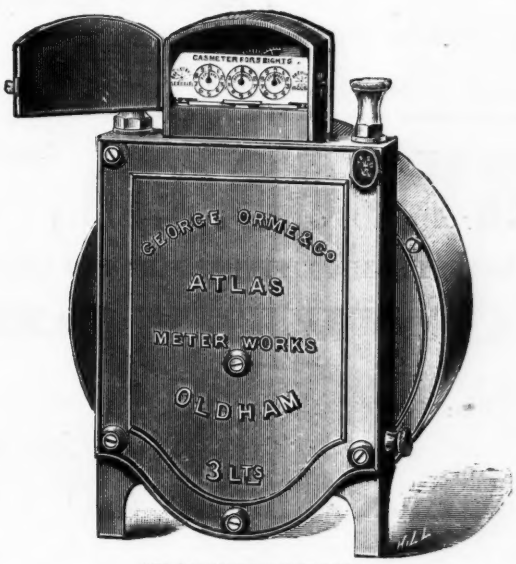
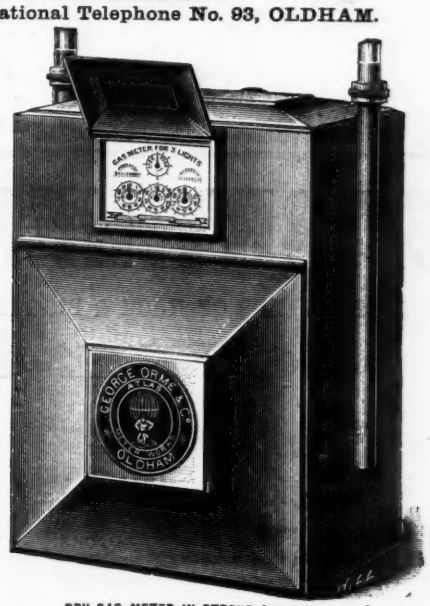


WET GAS-METER IN CAST-IRON CASE.



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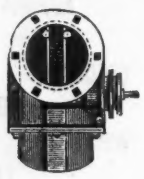

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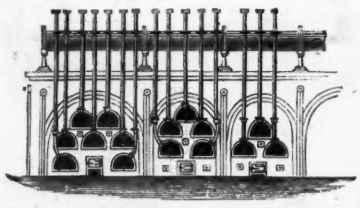

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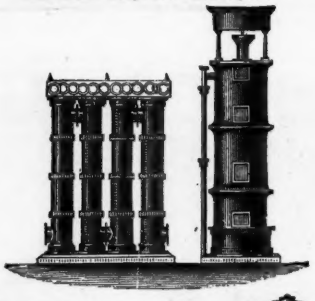

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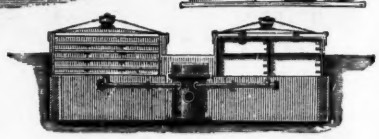

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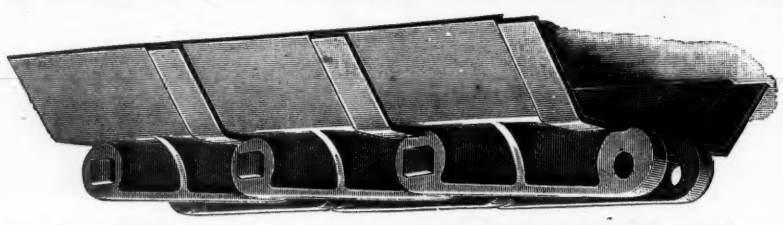

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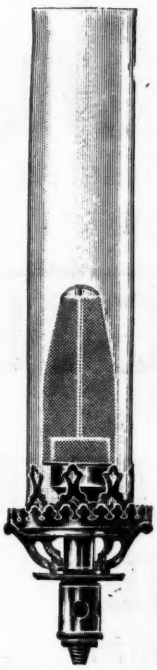

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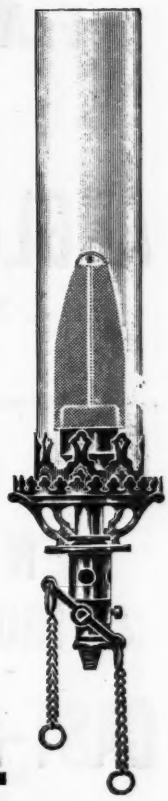

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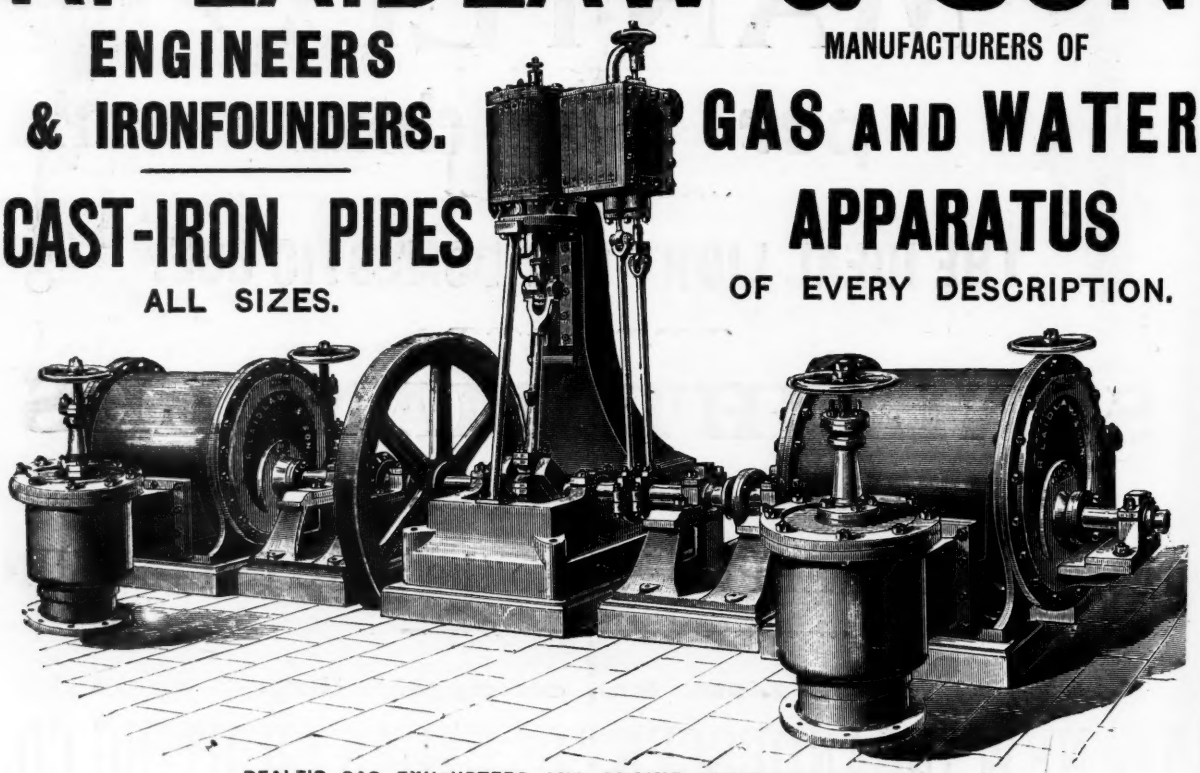

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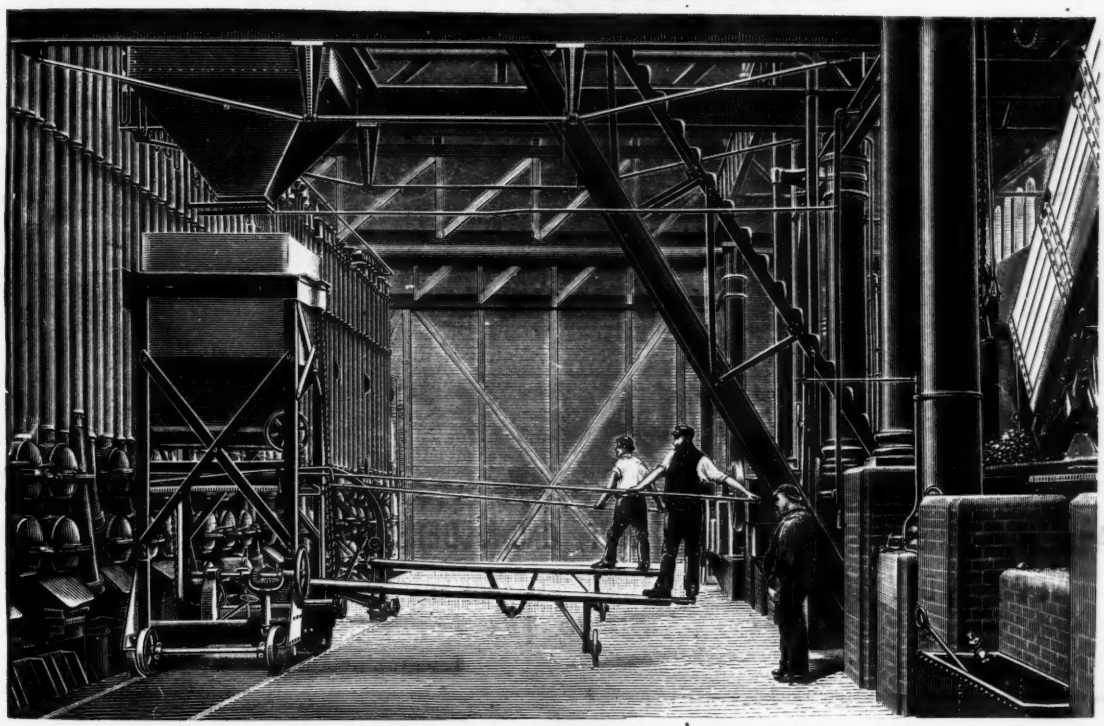

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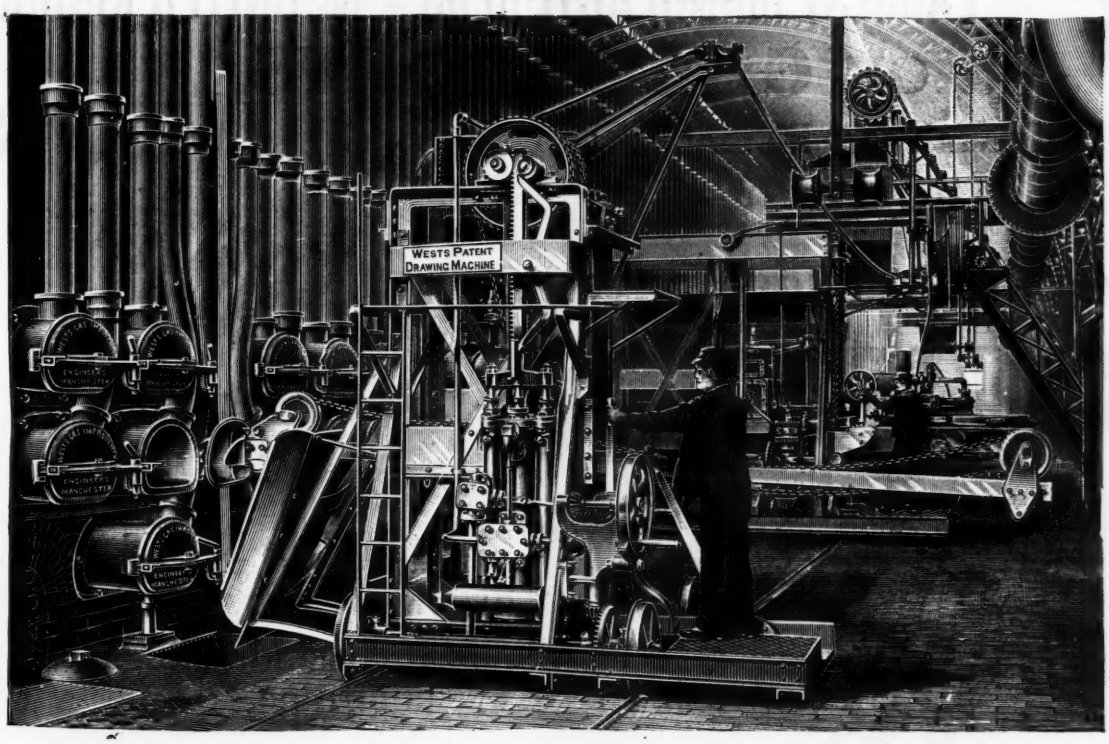

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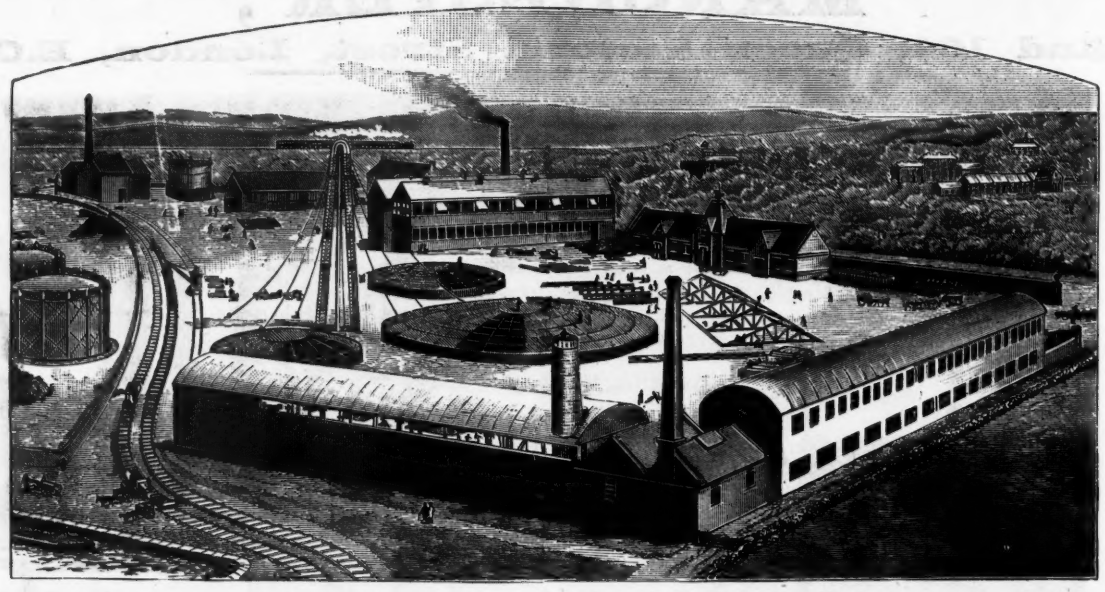

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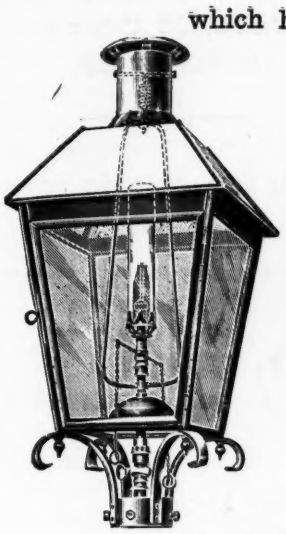

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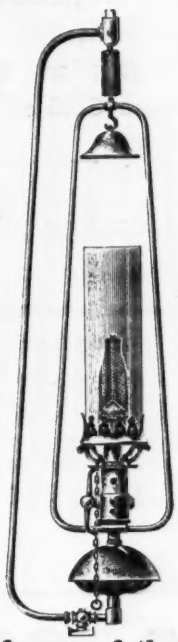

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"The mantles have worked out to an average of three per lamp per annum; but, bearing in mind the absence of frost last winter, the writer believes that four mantles per light is more likely to represent average conditions."

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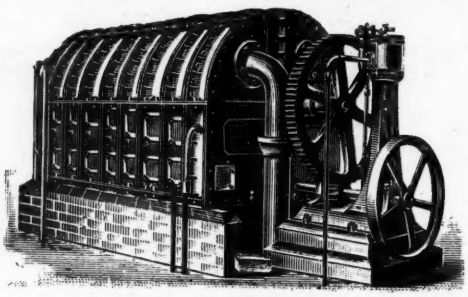

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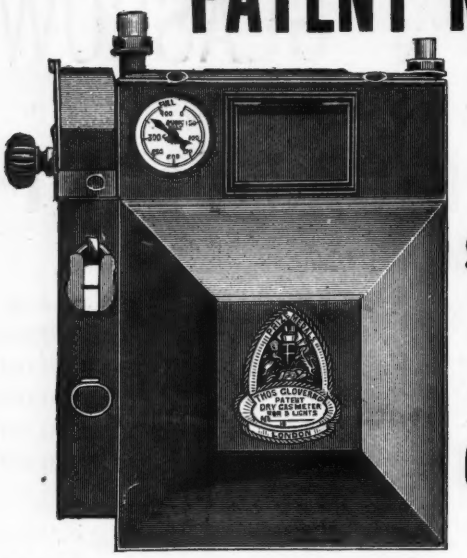

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EDITORIAL NOTES.

The Engineers' Strike and Lock-Out.

LAST Friday the London evening newspapers reported that the engineers' strike had collapsed, that the demand for an eight-hour day in the London district had been withdrawn, and that certain of the leading officials of the Amalgamated Society of Engineers had naively expressed the hope that with this withdrawal the employers would let bygones be bygones and take their old hands back on the old footing, as though nothing had happened. The sources of this intelligence were given as Glasgow and Manchester; and when confirmation of it was sought by the reporters at the London headquarters of the A.S.E., the great Mr. Barnes refused to be interviewed, but sent out word that he knew nothing whatever about it. To drop the painful subject and return to the *status quo ante bellum* probably represents the fondest hopes of the discredited strike leaders and their sorrowing dupes; but somebody else will have to say a word or two upon this proposition. There are the terms of settlement of the question of control, drawn up by the masters and accepted by the men's delegates to the conference. These may be taken as the lowest possible common ground upon which the employers—masters now in fact as well as in name—will consent to meet their old hands; and the sooner this is recognized the better. The "Daily News," now that the York election is over, has fallen back into its old futilities, and recommends "some "concession on the masters' part in the matter of hours, "in return for some concession on the men's part in the "matter of management." It seems impossible for these political amateurs of "Labour" to understand the fundamental idea that is meant to be conveyed by the word "management."

The immediate cause of the weakening on the part of the strikers was Fairfield. The official head of the A.S.E. was in Glasgow for some days, trying to detach the Fairfield yard from the Employers' Federation; and when it was known for certain that the lock-out notices that had been held in suspense would be acted upon, the blow was quite a "staggerer." Official denials notwithstanding, the impression was created and spread throughout the chief centres of the A.S.E. that "the game was up." The Employers' Federation naturally have no official knowledge of any change in the condition of affairs; and their operations will go on upon the same basis until the Joint Committee take another ballot, or issue another ultimatum, or do whatever may be effective in making submission to the inevitable. It would be the most grievous blunder now for the masters to rest content with anything short of this—not merely in their own interests, but for the sake of the future of the men, who must be made to see to what a pass their socialistic Union leaders have brought them.

The current strike literature is as interesting as usual. The interference of John Burns and some of the Independent Labour Party men in the York election had the result of demonstrating once more the truth that this order of agitators are not of so great account in any important English constituency as they fondly imagine themselves to be. Mr. G. N. Barnes, speaking last week at Edmonton, showed that he at any rate had learnt nothing from the course of events. He abused the Duke of Argyll and every other disinterested critic of the strikers' cause, and challenged the employers to "finish the fight in a fair "and square way." He will get his desire; but whether he will be satisfied therewith is altogether another matter. Mr. Walter H. Maudslay wrote to "The Times" of last Tuesday suggesting a sort of reorganized Trade Unionism to replace the present thing that bears this name, which pays the professional agitators who live by it better than anybody else concerned. He uttered the familiar impeachment that the existing system places in supreme command, not only of the resources of the Unions, but also of the liberty of action of the members, a class of men who are unworthy of the trust, even supposing such a trust to be expedient in the men's own interests. Mr. Maudslay would give every society member absolute control over his own accumulated subscriptions; so that if he deliberately chose to take part in a strike—which there would be nothing at all in the scheme to prevent—he would have to personally

draw out his money over a bank counter, and himself put it into the hands of his leaders. He shrewdly suspects that if this simple process had to be gone through, the trade of the professional agitator would fail in the land. There is not a wide difference between Mr. Maudslay's and Mr. Livesey's cures for the ills of the industrial body politic. Mr. R. Percy Sellon has written with reference to the all-important question, mentioned in our "Electric Lighting "Memoranda" to-day, of who is to supply the vast bulk of electrical engineering which the tramway service of the United Kingdom and the world generally will find work for during the next ten years. He shows that Continental and American firms have a long start of the English trade in this business; and he declares, from personal knowledge, that the former are not afflicted with the peculiar kind of labour troubles with which the A.S.E. is identified. Of course, they have others; but the mischievous policy of the A.S.E. and similarly inspired Trade Societies in England is so artificial and gratuitous a drag upon the development of the trade of the country, that there is no reason why it should not be cut off by a simple operation. This is the operation that is now in progress. It has been a long one, and attended with much suffering and loss. But the end is in sight. When it comes, there will be a good deal of reckoning up to be done all round.

Since the above was written, the fact of the withdrawal of the demand for an eight-hour day or 48-hour week by the Joint Committee has been confirmed. The Committee have had to ask the executive authorities of the various Trade Unions which they represent to give up unconditionally the claim upon which the strike was started more than six months ago. The thing was done with a turn of the hand, without a ballot or any other idle formality of the kind; and on Saturday the result was communicated officially to the Secretaries of the Employers' Federation. This circumstance shows how little power the ordinary members of the affected Unions possess in regard to the disposal of their accumulated funds or their means of livelihood. The next step will be for the Employers' Federation; and before the week is out it will transpire how the strike is to be settled. There is no reason to suppose that the masters will be hard upon the men individually; but whatever settlement is made must be in terms that the old disturbers of the peace will be unable to upset.

Some Novelties of the Gas Bills of 1898.

THE second portion of our abstract of the Gas Bills that await the consideration of Parliament during the ensuing session appears in another part of the "JOURNAL." So far as this compilation has gone—and it has only taken in the legislative schemes of Gas Companies, not those of Local Authorities—it has been of more than usual length and interest. The tale of Gas Bills is not simply a long one, but it contains an unusual number of measures which exhibit noteworthy departures from the ordinary Model Bill. Gas Companies would not go to Parliament at all if they did not need land, capital, and protection in carrying on their business; but being compelled to apply for these cardinal requisites, there are certain ancillary purposes which they are advised to put into their Bills, the nature of which marks the progressive development of the idea of statutory gas supply as the years go by. Stock consolidation and unification upon the basis of a rate of dividend approximating to the actual return of interest upon the investment, is now an established object of gas legislation; and there is a good deal of it in the new Bills. The application of this process of conversion to all privately-owned gas capital of the United Kingdom is evidently merely a question of time and opportunity. The desire to interest gas consumers and employees of Gas Companies in these undertakings in the capacity of proprietors is exhibited this year in the independent instances of Waterford, Enfield, and Thanet. The expediency of the supply of electric light by Gas Companies, in agreement with the Local Authority, is suggested in several examples, of which Tottenham and Edmonton is the most conspicuous.

Descending to smaller particulars, several Bills propose remedies for difficulties met with in the actual working of a statutory Gas Company. Some of these suggestions may be regarded as stereotyped, such as the clause limiting the period of error in defective consumers' meters, the clause defining the extent of the liability of consumers who quit premises without notice, and so forth. Others are less settled in form. There is, for example, the now frequent claim for exemption from the statutory penalty for defective supply in the event of unavoidable cause or accident. "Want of sufficient funds" may be pleaded, apparently, as an excuse for shortcomings in some places, but not in others. Relieving shareholders and directors and members of local authorities or contractors from inability to play some or all of these parts together is differently managed in different cases. Inspection of internal fittings is claimed under varying conditions in the Haslemere and St. Anne's-on-the-Sea Bills. The latter measure contains a special clause dealing with the sub-letting of premises, which must be an important consideration in a settlement of lodging-houses. In the Whitwick and Coalville Bill there is mention made of an uncommon luxury, in the shape of a "renewal fund." A threatened lawsuit at Winchester probably suggested the clause in the Enfield Bill which proposes to extend the main-laying facilities of the Gas-Works Clauses Act, 1847, to all pipes required to be laid by the Gas Company for any purpose connected with their business. Prepayment meters are mentioned, for the first time, in some Bills as obligatory in certain classes of houses; and at Southampton anybody who wants to use a gas-engine is to be compellable to fit it with an "anti-"fluctuator" also. Truly, the Imperial Parliament has to deal with many things that do not get reported in the newspapers. We are not going to discuss these various more or less novel points of statutory gas supply, but merely draw attention to the Bills exhibiting them, which are unusually interesting in consequence.

The Verdict upon the Cripplegate Fire.

THE long inquiry into the origin of the great fire in the Cripplegate district of the City of London has terminated, and the verdict of the Coroner's jury has disposed of at least one of the delusions that were industriously promulgated by the ubiquitous newspaper reporter, as noticed in the "JOURNAL" for Nov. 30 last. The character and the incidents of the conflagration were sufficiently commented upon at the time; and we recorded the fact that while some newspaper reports gave an explosion of gas as the cause of the fire, the official report entered the cause as "unknown." The Coroner's inquiry has traced the matter a little farther. It is found that the fire originated in a certain warehouse, at a time ascertained to within five minutes, with "the ignition of a stack of goods near the "well-hole on the first floor." This was not due to spontaneous combustion or to a gas explosion. Beyond these findings, it is not our province to go. Space may be found, however, for the concluding recommendation of the jury, which was "that this area should be so reconstructed as "to have greater regard to the safety of the adjacent "property; and that in all new buildings of the warehouse "class match-lining on the walls and ceilings be prohibited, "all ceilings to be plastered or covered with fire-resisting "material." The important part of this recommendation, from our point of view, consists in what is omitted from it. There is not a word about the risk of gas lights and stoves, or the part supposed to be played by gas mains and services in spreading a great fire. The jury arrived at the conclusion that somebody started the Cripplegate fire for his own purposes, whatever these may have been; and when once this judgment was formed, it follows that all questions of the means of lighting and other matters faded into comparative insignificance. If the district had been lighted, not by electricity, but by bottled sunlight, and somebody wanted to burn it down, the job would have been easy enough in the circumstances. The verdict of the jury leaves the main question precisely where it should be left—with the designers and builders of warehouses. It is they only and their employers who have to solve the problem of reasonably safe construction. To bring the Cripplegate incendiarism home to the perpetrator would not have lightened the main question one jot; and it is rather something to be thankful for that the verdict of the jury has not diverted the public mind from the major consideration to that of the presumed guilt of some unhappy malefactor. What has to be regarded is not the culpability of some John Smith, but the responsibility of owners and architects for so rebuilding the Cripplegate warehouses that the criminal John Smith shall not be able to do so much mischief in the future as in the past. In the present instance, there is no evidence to show that the incendiary made use in any way

of gas for effecting his nefarious purpose; but this was indeed unnecessary, as a less hazardous agency was found sufficient.

Dugald Clerk on Large Gas-Engines.

In the current number of the "Engineering Magazine," there is a most interesting article by Mr. Dugald Clerk on "The Economy and Efficiency of the Large Gas-Engine." Curiously enough, the writer begins by explaining that in a sense his essay is to be something like the celebrated chapter of the Natural History book "On the Snakes of "Ireland," inasmuch as he is bound to confess that "when "compared with steam-engines, it cannot be said that any "large gas-engines are yet in existence." Notwithstanding this initial reservation, he manages to tell a highly attractive story of the way in which gas-engines have been made as large as they are—say, up to 200-horse power. Mr. Clerk states among other things that at the present time the total production of gas-engines in Britain reaches about one hundred a week; but the average horse power is about 20. There is little demand in England at the present time for very large gas-engines; and Mr. Clerk allows it to appear that he is not surprised at this. To build a perfectly successful large gas-engine, something more is needed than simple enlargement of parts; and this sometimes is often of an unexpected character. Thus some of the most satisfactory large gas-engines hitherto made—engines, that is to say, of more than 100-horse power—exhibit features the reasons for which are anything but obvious. There are not many of these engines at present working in the United Kingdom. The writer estimates the number of all makes at less than a hundred; and, of course, when gas-engines attain this size, the use of coal gas becomes too expensive. Here the "producer" comes in; and this means a further complication. We are promised a further communication from Mr. Clerk, in which the leading difficulties of the problem of large gas-engines as they now present themselves are to be considered; and it is hardly necessary to remark that anything that he may have to say upon this subject is to be received with the utmost respect.

The Miners' Federation and the Workmen's Compensation Act.

The Annual Conference of the Miners' Federation has been in progress at Bristol, under the presidency of Mr. Pickard, M.P., who entertained his auditory with an address mainly composed of the ordinary stock balderdash that passes for New Unionist politics. He talked about the possibility of laying the whole country idle through a general agreement among the "workers" to stop work. There was the old delusion running through the address that it is only the men who are in the habit of being "stripped and working at the "coal face" who are to be called working men, or are to be supposed to know anything about the needs and circumstances of the working man. After breathing much fire and slaughter of the capitalist, however, Mr. Pickard sang very small upon the question of whether coal miners should "go in for bettering their condition." He thought "the "time was not opportune for decided action"—a counsel rather of expediency than of perfection, from the Federation point of view. The most interesting feature of the conference, however, was not the presidential rhodomontade, but the discussion that took place upon the Workmen's Compensation Act, which was regarded in some quarters as fraught with danger to the coal-mining industry. When the subject was brought before the conference, it appeared that the delegates were divided as to the merits of the Act. Some claimed it as a Trade Union product, and consequently impeccable; while others saw in it nothing but an additional proof of the turpitude of the House of Lords, the employers, the doctors—in brief, everybody but the saints of "Labour." At these meetings the men of moderate views, and those who stick to the facts, appear to be always overridden and shouted down by the extremists. With regard to the Workmen's Compensation Act, the miners, like everybody else, are in doubt as to how it will work until it comes into operation, which will not be until July 1 next. Consequently, all discussions of its provisions for the time being seem like echoes of last session's parliamentary debates. It might have been thought that the Miners' Federation discussion would have thrown some fresh light upon the prospects of the Act. But it is one of the disappointing characteristics of these assemblages of what are called "practical men" that they never produce any really valuable fruit, either of initiative or criticism.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 138.)

The increase in activity on the Stock Exchange made some fair progress last week—an advance which may be hoped to become all the more substantial for being slow and steady. The tendency, too, was generally favourable all round; and prices in pretty well every department came out better. The evidently imminent collapse of the Engineering strike had a good effect; and the Foreign market was much less agitated. The settlement did not develop anything startling. The Money Market was easy. Supplies being abundant, the ordinary demands had no effect. Deposit rates were lowered. Business in Gas was moderate on the whole—most days being quite quiet; and though one or two of the chief issues would now and then look like making a spurt, it soon died away. Prices too for the most part were left unchanged; the alterations in quotation being extremely few in number, small in extent, and confined to issues which are not of the highest importance, or which impart a tone to the market in general. However, such as the changes are, they are all in the upward direction; and the unaffected issues are all steady and looking firm. In Gaslights, the "A" was only moderately dealt in at pretty even figures, which never ranged far from the 314 line. The secured issues were scarcely touched; and the few transactions marked indicated no change impending. South Metropolitan stuck tight to 144½ all the week; business being moderate. In Commercials, there was nothing but one special bargain in the debenture. The Suburban and Provincial divisions were absolutely devoid of all feature—hardly anything changing hands all the week. Among the Continental companies, Imperial was most in evidence. On Thursday, it was as low as 216; but it hardened afterwards, and the closing mark was 219. Union and European were strong though rather inactive; and the preference stock of the former advanced a point. Of the rest, none were conspicuous but Cape Town and Oriental, each of which had an improvement. Transactions in Water were extremely few; but the general tone was very strong, and several issues had a moderate advance in price.

The daily operations were: Gas stocks opened very quiet and unchanged on Monday, and made no sort of mark all day. Tuesday's programme was just the same, and no quotation made any move. In Water, Lambeth tens rose 1. On Wednesday, all Gas stocks continued just as quiet, and still prices remained fixed. In Water, Chelsea rose 2. Thursday was as quiet as the preceding days; and no sign of change in prices was made. In Water, Lambeth tens rose 1; and ditto 7½ per cents, 2. Friday produced some activity in Imperial Continental, though everything else was languid enough. Continental Union preference advanced 1; Cape Town, ½; and Oriental, ¼. In Water, Southwark debenture rose 1. Saturday was quite still, and nothing in Gas moved; but East London Water improved 1.

ELECTRIC LIGHTING MEMORANDA.

Mr. J. W. Swan's Address to the Institution of Electrical Engineers—The Expansion of Electrical Industries—The Future of Electro-Chemistry—Mr. J. S. Raworth's Address.

A Meeting of the Institution of Electrical Engineers was held last Thursday, when the President, Mr. J. W. Swan, F.R.S., delivered his Inaugural Address. As was natural, the speaker first took his hearers back with him to a certain meeting of the Society of Telegraph Engineers sixteen years ago, when the subject of a new method of illumination by incandescent electric lamps was brought under the notice of the Society. There was a place outside the building where a portable steam-engine and a dynamo had been set up; and when, at the psychological moment of the discourse, the gas-lights in the hall were turned down and the electric current was switched on, the assembly gave an audible expression of surprise at seeing the new lamps light themselves. Mr. Swan was justified in indulging in this reminiscence; and nobody can complain of him for declaring that the occasion "marked the beginning of a movement which had gone on with increasing activity, until now it might be said that a great revolution in the means of producing artificial light for common use had been accomplished, a profitable industry had been created, and an inducement given to the larger and more general utilization of electricity." Mr. Swan, to do him justice, has never been chargeable with taking part in the more sensational side of incandescent electric lighting. It was not he, but certain American partisans and exploiters of Edison, who were responsible for the ridiculous megalomania that struck almost everybody concerned in the new electric lighting industry. Mr. Swan did a great thing when he produced the first practical incandescent electric lamp; but he has never sought to magnify his own part in the great electrical expansion of these closing years of the century.

On Thursday, Mr. Swan quickly left the subject of electric lighting, to lay stress upon the activity of electrical invention

and electrical work extending over the departments of electric power, electric traction, electric transmission, and electro-chemistry. It would be a curious inquiry to investigate the connection between the introduction of practical electric lighting and all these other applications of electricity on the large scale which have already thrown the lighting business into the background. There is no obviously necessary connection between an incandescent electric lamp and a trolley tramcar or a steam-pipe made of electrically deposited copper; but it might be argued that it was the lamp that made the other things possible. We believe fully that this was the way of it. When Swan and Edison were working at the incandescent electric lamp, there was no electrical industry such as exists to-day—nothing like it in kind, not merely in volume. There were telegraphists and silver platers; but otherwise nobody made much use of electricity in the arts and industries. Now, thanks to the impulse given by the first commercial employment of the dynamo in the work of lighting, all sorts and any amount of use is found for this piece of apparatus.

It says much for Mr. Swan's catholicity of mind that he finds more promise of reward for study and ingenuity in electro-chemistry than in lighting or traction by electricity. He is not one to talk about the possibility of obtaining light by means of electricity produced directly from burning fuel, or to indulge in any other dreams of the kind that enable the ordinary lecturer and magazine writer on the future of electricity to pad out his text. Nor would this sort of thing go down well with the Institution of Electrical Engineers, whose members would not endure from one another the specious stuff that some of them are not ashamed to vend to local authorities. In commending to rising electricians the study of electro-chemistry, Mr. Swan uttered counsel which is none the less sound for being a little trite. Whatever may be the character of the operations, it seems pretty plain that electrical methods will enter more and more into the industrial chemistry of the future.

Another interesting address which may be fitly noticed here was that of Mr. J. S. Raworth to the Northern Society of Electrical Engineers, delivered at the annual general meeting of the Society on the 10th inst. Mr. Raworth is usually outspoken to the verge of audacity. But his ability is unquestioned; and his experience, both of electrical and mechanical engineering, is great. He corroborates what we have just advanced respecting the reality of the connection between the production of the Swan lamp and the expansion of electrical industry generally. Wisely, Mr. Raworth devoted himself to the expounding and discussion of facts, not dreams; but he threw an air of real distinction over his whole address by declaring at the beginning and end of his discourse that the one prime necessity for the electrical engineer, as of every other man, is *faith*. One hardly looks for such a note to be struck in a technical discourse; but in this case it is present, and one is thankful for it. Because it is of all things necessary that whosoever shall go into the electrical industry, or gas, or any other serious occupation, should have faith that his work is worth doing with all his might. Half-heartedness is no good. At the present crisis in electrical engineering, there is more need of faith than ever. The leaders of the industry have to make themselves masters of their own business; and then they must prosecute it for all it is worth. Mr. Raworth would not say a single word about the application of electrical power to main lines of railway. That matter he considerately reserved for his successors. But with regard to the working of tramways and light railways the case is different. He thinks, with some reason, that "very soon horse traction will be superseded by electricity on the whole 1000 miles of tramway now existing; and in addition to this, London will be honeycombed with subterranean electric railways, and provincial towns will adopt systems of surface tramways far more elaborate and extensive than those which now exist, even if they have to widen their streets to accommodate them." This is in great measure true. The chief question for English electrical engineering firms is whether they are in a position to take up this work, or will simply stand by and see order after order go to America and the Continent. There is much in Mr. Raworth's address that makes one think; but this pressing question of who is to do the electrical—that is, the mechanical—engineering work of England during the next ten years, when the tram-horse is to disappear from the land, and the countershaft and belt to vanish from the factory, is far and away the most serious subject of consideration that this or any other address has mooted of late years.

The Index to Vol. LXX. of the "Journal," July to December, 1897, is now ready; and a copy will be forwarded (post free) by the Publisher, on receipt of a post-card from any Subscriber.

Patents in 1897.—The number of applications for patents during the past year was 30,936. Those in 1896 numbered in the aggregate 30,194, as compared with 25,065 in 1895. In 1896, only 13,360 of the 30,194 applications were completed; the rest being allowed to lapse after the nine months' protection.

Sugg's Gas Engineer's Pocket Almanack and Lighting Table for 1898 has been issued in its accustomed form. It contains the usual series of tables which Gas Managers find useful in their daily work, and illustrated particulars of the firm's photometers and other appliances, including their latest forms of lamps for incandescent gas lighting.

THE TEN-CANDLE DIBDIN STANDARD OF LIGHT.

The first report of the Committee appointed at the meeting of the Incorporated Institution of Gas Engineers, in May, 1896, "to investigate and report upon the proposed standard of light and the relation of gas measurement to temperature," has been issued, and is reprinted in another part of the "Journal."

Readers will remember that the appointment of the Committee was the outcome of the reading and discussion of a paper by Mr. Lewis T. Wright, on the "Efficiency of the London Argand at Different Rates of Gas Consumption," at the 1896 meeting of the Institution. Some indication of the real intent of the paper was afforded by the words "with special reference to its use as a Gas-Testing Burner," which followed the innocent-enough title; but probably few persons suspected before perusal of it, that it contained nothing more nor less than a direct challenge of several of the findings of the Photometric Standard Committee appointed by the Board of Trade in December, 1891. This Committee, in a report of which the text was given in the "Journal" for May 14, 1895, found that the light given by Mr. Harcourt's pentane air-gas flame, as defined in the appendix to the report, was a true representative of the average light afforded by the standard sperm candle. But inasmuch as a light approximating somewhat in value to the light of about a 16-candle coal-gas flame such as is usually tested, had practical advantages in the direct comparison therewith, the Committee proceeded to recommend the ten-candle Dibdin standard for the every-day testing of coal gas. The standard was described, and the grounds for its recommendation by the Committee were set out, in sections of the appendix to the report. Mr. Lewis T. Wright, in the paper already referred to, brought forward results of experiments which appeared to controvert some of the researches on which the Board of Trade Committee had based their recommendation of the Dibdin standard. Moreover, Mr. Methven, in the discussion of Mr. Wright's paper, made a fresh series of allegations against that standard. Thereupon a Committee, consisting of eight members of the Institution, were appointed to investigate the matter; and the result of their deliberations so far is in the hands of our readers this week.

It is of paramount importance that the proposed standard of light shall not be sanctioned for official use in the testing of gas if there is the smallest suspicion that it does not fulfil the claims made for it in the report of the Board of Trade Committee. For this reason, the Institution has done the gas industry a signal service in appointing a Committee to investigate the objections raised against those claims; and the members of the Committee deserve the thanks of all concerned in the establishment of a trustworthy standard of light for the time they have devoted to the experiments described. Mr. Lewis Wright withdrew from the Committee for the reason stated in the report. The loss of his help must have been very great, especially as it was from him that the objections raised to the proposed standard first emanated. Five members undertook independent experiments with it; and their labours are distinguished in the report by the letters A, B, C, D, and E. This concealment of identity assuredly will not add weight to the results, and was ill-advised—seeing that the Board of Trade Committee, a portion of whose work was under criticism, did not fail to give the names of the investigators in the researches recorded in the appendix to its report. B appears here to have been the most energetic worker of the five.

The claim that the proposed standard is of the value of ten standard sperm candles has been objected to by Mr. Methven, who asserted that it was 3 to 5 per cent. higher in value. Experiments extending over a year made by one member of the Committee—presumably not Mr. Methven—are stated to have proved that one specimen of the proposed standard gave the gas nine-tenths of a candle lower value than candles gave it. This is a most serious allegation; and it must be investigated and substantiated by independent evidence if it is to outweigh the work which was taken by the Board of Trade Committee to establish the value of the standard. A reference to the report of that Committee reveals the fact that the unit of light by which the 10-candle standard was standardized, was the one-candle pentane air-gas flame already mentioned. The question then arises whether the candles used in the twelve months' tests had an average value equal to that of the pentane air-gas flame. The latter has not now been impugned; and the evidence which proves it truly representative of the average value of one standard candle is almost incontrovertible. There is thus no alternative than to suppose either that the candles used in the twelve months' trial mysteriously gave too low an average value, or that the testing was in fault in one set of comparisons. Seeing the length of the period of trial, the first supposition may be set aside; and we are forced to weigh the evidence as to the actual testing in the two cases. The tests carried out for the Board of Trade Committee appear to be ascribed chiefly to Mr. W. J. Dibdin; while we do not know who of the eight members of the Committee appointed by the Institution is actually responsible for the twelve months' tests. Presumably, too, they were not carried out by that member personally, but by a subordinate gas tester, who would scarcely have the scientific knowledge and acumen essential in research work, though doubtless carrying out his routine of straightforward tests admirably.

Mr. Dibdin is the inventor of the proposed standard, and he would be fully alive to its merits and faults; and if the personal equation could enter into such researches, he would probably secure more uniform results from his standard than would others less familiar with it. But a difference of as much as nine-tenths of a candle in the illuminating power of ordinary gas is too large to be attributed to any such origin; and there is no doubt that a serious discrepancy has been found in the value of at all events one specimen of the proposed standard. But if in one, why not in others? A statement to the effect that "the proposed standard is of greater value than ten standard sperm candles," will, however, have to be authenticated by the researches of more than one observer on more than one of the proposed standards, before it can claim more than passing notice; and the Committee of the Institution must undoubtedly collect more evidence in support of this primary objection to the standard. The statement made will nevertheless considerably shake the faith which many were prepared to place in the ten-candle standard; and doubtless independent observations will be made.

The next objection considered in the report questions the claim that the standards can be made with an accuracy sufficiently great to ensure their uniformity. This objection is closely allied to the more radical one already dealt with; but it meets with far more adequate treatment at the hands of the Committee. Each of the five observers undertook a set of experiments; and the sets were brought into correlation by a system of interchange of standards between the observers. No fewer than eleven standards were thus examined; and at the close of this section of the report, one of them is taken to represent exactly ten candles, and the values of the others are shown in terms of it. It would be very interesting to know which one—if any—of these eleven standards was used in the twelve months' trial undertaken for the refutation of the claim that the standard is of the value of ten standard sperm candles. A difference of 0·44 candle appears between the values of the two most divergent of the eleven standards; and if the higher of these two happened to be the one used in that trial, the significance of the results obtained therein is greatly minimized. In any case, the difference observed between the values of various standards fully confirms our contention that the evidence of the twelve months' trial needs substantiation by observations on more than one of the standards.

Much importance appears to be attached in the report to the effect of the interchange of position of the two standards undergoing comparison. Now if a certain relation is found to subsist between two standards, does it follow that the standards are at fault because that relation is not preserved when their positions with regard to the disc are reversed? May not a difference observed in a reversal of this nature be due as much to defect in the organs of vision of the observer as to difference in the values of the lights under comparison? Should not provision be made for the observer to take readings from the back, as well as the front, of the photometer, if such interchange of position of the standards is permitted? If the observer's right eye be slightly better than his left, he secures a sharper impression of the image of the right-hand face of the disc. If then he finds two sources of light equal in value, and subsequently reverses their positions with regard to the disc, he will no longer find them equal in value. But if after the change of position he passes to the back of the bar, and having the means of doing so, he makes a comparison while there, the equality will remain; unless, indeed, the sources of light actually have changed in value with the alteration in their positions. As a matter of fact, very few persons can boast that their right and left eyes are equally receptive of impressions. The method of comparison adopted by the Committee appears ultimately to eliminate any error which might arise from any such cause; and, indeed, the number of observers engaged on the experiments would tend to produce a correct final average. But the observation made by B, that two standards when compared did not give from day to day the same results, speaks more against the adoption of the proposed standard than the differences observed on interchange of position on the photometer bar. It is a pity that these interesting results obtained by B are left unconfirmed by his *confrères*.

The objections to the third claim—which is "that the value of the standard is unaltered when its flame varies from $\frac{1}{2}$ inch below to $1\frac{1}{2}$ inches above the prescribed height of 3 inches"—are confirmed by experiments made by B, and much less strongly by others made by E. The claim itself appears to be founded on certain observations made by Mr. Dibdin, and recorded at length in the appendix to the report of the Board of Trade Committee. But in the same appendix, we find that Mr. Vernon Harcourt's testings did not lead to such a comprehensive claim on behalf of the standard. We may here quote *verbatim*, a portion of the clause narrating his experiences: "With the top of the flame coinciding with the bar which marks its normal level, or a *little* below this, or *nearly an inch* above, the light emitted does not vary *by more than about 1 per cent.*" The words which we print in italics—they are not thus in the original—emphasize the fact that Mr. Harcourt, who is one of the most careful observers of our times, did not find his testings justify him in uttering nearly so definite a claim for the standard as that to which Mr. Wright, Mr. Methven, and the Committee of the Institution take exception. There is no doubt that the claim objected to is unnecessarily comprehensive; and the standard would lose little in estimation or in practical value, were Mr. Harcourt's words substituted for it.

The claim to the effect that coal gas may be substituted for air as the carrier of pentane vapour, was objected to in the first instance by Mr. Wright; and his objections are substantiated by some experiments made by B. It seems strange that the Board of Trade Committee ever permitted themselves to be persuaded that gas could be substituted for air as the carrier of pentane vapour with impunity, whatever might be the convenience of such a substitution. Gas is a complex mixture, of very varying composition; and there is no question that the pentane flame is affected by changes in the nature of the carrier of the vapour. Thus coal gas may have a very different effect on the flame, according as it is unenriched or enriched by cannel gas, carburetted water gas, or oil gas. The Committee of the Institution should concentrate their attack on the proposed standard upon this claim; for undoubtedly only one carrier of the pentane vapour should be recognized for official purposes.

The fifth objection to the standard is that the light is affected by rise of temperature; but though B's experiments are stated to have confirmed this, the actual figures obtained by him are not given, and cannot therefore be discussed here. It was quite evident, from the report of the Board of Trade Committee, that care was necessary in the selection and use of chimneys; and in one instance the Committee of the Institution show that even greater care than was contemplated by the compilers of that report is required. In this connection, we are disposed to inquire if, when the standards were tested against one another by transposition from side to side of the disc, the chimney was "always used in the same relative position as regards the disc," as recommended in the report?

In conclusion, we welcome this first report of the Committee of the Incorporated Institution of Gas Engineers as an excellent contribution to the criticism of the proposed standard of light, on the part of men who have little leisure for the researches they have undertaken to make in the interests of the gas profession. We welcome it still more as an earnest of further reports, which will fill the *lacunæ* in the present one. Criticism of the proposed standard will, for all practical purposes, come too late if it be delayed, and the standard in the meantime receive official adoption. It is eminently essential that, whatever standard is ultimately sanctioned, it should be generally acceptable to those engaged in the gas industry.

GAS BILLS FOR 1898.

(*Continued from p. 75.*)

THE following Bills relate to statutory Companies:—

The Aberystwyth Gas Bill recites that by an Act of 1873 the Company were authorized to purchase the fee simple of the leasehold lands held from the Corporation, upon which the old Company, formed in 1839, had erected their works. This right was to be exercised at any time within three years from the passing of the Bill, if the Corporation should within two years of the same period require the Company to purchase; but if the Corporation should not make this requisition, then the right of purchase should be exercisable by the Company within ten years. The Corporation did not make the requisition; and the Company did not exercise their powers, which expired in 1883. It is now proposed to revive these powers for three years. Also, the Act of 1873 authorized the Company to raise £15,000 additional 7 per cent. capital; but none of this has been issued. The original capital of the Company stands at £8000; and there is a mortgage debt of £600. The Company have expended out of revenue, for capital purposes, upwards of £10,000; and it is proposed to capitalize £8000 of this amount, and issue the same as preference capital to the holders of ordinary shares, share for share. This sum is to bear a fixed perpetual preference 5 per cent. dividend. It is also proposed to raise £12,000 of new additional 7 per cent. capital, to carry the usual borrowing powers. The sliding-scale is asked for, with an initial price of 5s. per 1000 cubic feet for 15-candle gas.

The Cromer Gas Bill is to incorporate the Cromer Gas and Coke Company, who procured a Provisional Order in 1876, when the capital was fixed at £5000 original and £5000 additional capital; and the Company have a mortgage debt of £5000. The limits of supply are to be the parishes of Cromer, Overstrand, Runton, and North Repps. It is proposed that the capital of the Company shall be £96,573 ordinary 5 per cent. stock, whereof £16,573 is to be divided among the existing shareholders. The remainder is to be additional capital. The borrowing powers are to be one-fourth of the ordinary stock issued. The qualification of a director is to be £100 of stock. It is proposed that "no person shall be disqualified from becoming or continuing a director of the Company by reason of his or any partner of his being or becoming interested in any contract with the Company, either on his own behalf or as a member of any company, corporation, local authority, or partnership; but no such person shall, as a director, vote in respect of any question as to any such contract." There are other provisions respecting the appointment to and holding of office as director. The sliding-scale is asked for with the initial price of 4s. 6d. per 1000 cubic feet for 15-candle gas. No penalty for defective

supply is to be incurred where the default was beyond the control of the Company or was of an unimportant character. Want of funds is not to be pleaded as an excuse.

The Enfield Gas Bill is to extend the Company's limits of supply, partly over an area belonging to, but not occupied by, the Tottenham and Edmonton Gas Company. Additional lands are required. As from Jan. 1, 1899, all the shares in the existing ordinary capital of the Company are to be consolidated into 5 per cent. stock, and the preference stocks are to be similiarly consolidated. Additional capital to the amount of £50,000 is required, with borrowing powers in the usual proportion. The sliding-scale is asked for, with 4s. 6d. per 1000 cubic feet as the standard price. Clause 44 runs as follows:—

It shall be lawful for the Company to utilize, for the purpose of procuring, conducting, or disposing of any materials used by them in or resulting from the manufacture of gas or residual products thereof, or for any other purpose connected with or ancillary to their business, any mains, pipes, or works for the time being of the Company, whether laid or placed in any street or elsewhere within the limits of the Company for the supply of gas; and the provisions of the Gas-Works Clauses Act, 1847, with respect to breaking up of streets for the purpose of laying pipes, and for the protection of pipes when laid, shall, so far as applicable, extend and apply to the laying down and placing, repairing, altering, or removing and protection of mains and pipes for such purposes.

Power is sought for procuring and working an Electric Lighting Order. All charges lawfully made by the Company are to be recoverable in the same way as gas-rents. Prepayment may be required for gas to be supplied for a temporary purpose. It is proposed that employees and consumers shall have the same priority usually allowed to existing stockholders when bidding for new issues at the same price as offered by the public.

The Folkestone Gas Bill is to enable the Company to acquire additional lands under clauses for the protection of the occupiers. It is desired to raise £130,000 of additional 7 per cent. capital, with the usual borrowing powers.

The Gaslight and Coke Company's (Capital Consolidation) Bill is limited to the purpose stated in the title. The particulars of the different divisions and classes of capital affected by the Bill are set out in three schedules, which cannot be reproduced here. All the Company's existing preference stocks, amounting together to the sum of £1,806,590, are to be consolidated and converted into one 4 per cent. preference stock of the amount of £3,799,737 10s. The Company's "H" maximum stock, amounting to £1,300,000, is to be converted into £2,600,000 of 3½ per cent. maximum stock. The Company's "A" ordinary stock issued, and amounting to £5,992,110, is to be converted into ordinary 4 per cent. stock of the amount of £14,805,275. The unissued balance of £175,000 "A" ordinary stock will become £437,500 of the same new ordinary stock. This issue is to be subject to the proviso that such an amount of the authorized £350,000 of 3 per cent. consolidated debenture stock shall be previously issued as shall be equal to four-fifths of the nominal amount of the ordinary stock in question. All the Company's debenture stocks are to be converted into a 3 per cent. consolidated debenture stock as before mentioned. The conversion is not to affect trusts; and it is proposed to authorize trustees to invest in both the new 4 per cent. consolidated preference and the 3 per cent. consolidated debenture stocks. The sliding-scale is to be adjusted as follows: "For every penny or part of a penny charged in excess or in diminution of the initial price of gas in any calendar year, the initial rate of dividend shall for such year be reduced or increased by two shillings." A clause deals with the application of the net profits as between the preference, maximum, and ordinary stocks. After the preference dividends are provided for, what remains is called net profits. Out of these, in the first place, is to be paid "rateably and without preference or priority," a dividend up to 3½ per cent. per annum on the 3½ per cent. maximum stock, and up to £2 16s. per cent. per annum on the ordinary stock. Any surplus after this is to go to making up further dividend on the ordinary stock to the legal amount. The 3½ per cent. "maximum" dividend is to continue at this figure so long as the standard price charged for gas does not exceed 4s. 9d. per 1000 cubic feet, and the standard dividend on the ordinary stock does not fall below £2 16s. per cent. per annum. But if either of these results happens, then for every further increase of 1d. on the standard price, or fall of 2s. in the standard rate of dividend, the rate of dividend on the 3½ per cent. maximum stock is to be reduced by 2s. 6d. The qualification of a director is to be £5000 of ordinary stock; and that of an auditor, £1500 of the same stock. The insurance fund is not to be increased beyond £460,200.

The Gloucester Gas Bill is to extend the limits of supply, and to authorize the Company to acquire lands and construct or contribute to the construction of railway sidings. The existing capital is to be consolidated into a uniform 5 per cent. stock; and £70,000 of additional capital is required, with the usual borrowing powers. Prepayment for temporary supplies of gas may be demanded; and for monthly or weekly tenants, or for holdings of less than £16 annual rateable value, the use of an automatic prepayment meter may be required.

The Hartlepool Gas and Water Bill is mainly for extended water powers; but certain provisions relating to the issue of debenture stock apply generally to the undertaking.

The Morley Gas Bill is to extend the limits of supply to include the township of Churwell, in the parish of Batley. All the Company's existing capital is to be consolidated into a uniform 7 per cent. stock. One class of 5 per cent. stock is to be so treated. The undertaking of the Churwell Gas Company is to be acquired by agreement.

The Plymouth and Stonehouse Gas Bill is to enable the Company to acquire additional gas lands, and to enlarge the district of supply. The existing capital of the Company is to be consolidated into a sum of £277,000 of ordinary 5 per cent. stock. Additional capital to the amount of £80,000 is required, carrying power to borrow £20,000 after the new stock has all been issued. The auction clauses are to apply to mortgages.

The Redhill and Reigate Gas Bill is to enable the Redhill Company to acquire additional lands, and to raise £52,000 of additional capital, with power to borrow. The sliding-scale is asked for, with 3s. 8d. as the initial price within the borough and 4s. 2d. beyond. The undertaking of the old Reigate Company is to be acquired by the Company as from Sept. 29 next., upon conditions stated, one of which is the transfer to the proprietors of the Reigate Company of £35,000 in paid-up shares of the Company. The officers of the Reigate Company are duly provided for; and two of the Directors are to become Directors of the Company. As from the date of the transfer, the name of the undertaking is to be changed to the "Redhill and Reigate Gas Company." It is proposed that at any time, with the sanction of three-fifths of the holders of ordinary shares and stock in the Company, the existing ordinary capital shall be consolidated into a 5 per cent. stock. Payment in advance is to be made for temporary supplies of gas; and automatic prepayment meters may be required to be used by monthly or weekly tenants, and for holdings of less than £25 rateable value.

The Southampton Gas Bill is to extend the limits of supply of the Southampton Gaslight and Coke Company, and authorize the acquisition of additional lands. A street in Southampton is to be widened, and another thoroughfare stopped up. The existing capital of the Company is to be consolidated as a 5 per cent. stock to the amount of £344,000. New 4 per cent. debenture stock is to replace the old debenture stock. New capital to the amount of £200,000 is required, to bear a 7 per cent. dividend; with the usual borrowing powers. Permission is sought to apply for an Electric Lighting Order. Clause 39 of the Bill runs as follows:—

Every consumer of gas supplied by the Company who uses a gas-engine shall, if required to do so by the Company, use an anti-fluctuator, and shall at all times, at his own expense, keep such anti-fluctuator in proper order; and in default of his so using or keeping such anti-fluctuator in proper repair, the Company may cease to supply gas to such consumer. The Company shall have access to, and be at liberty to take off, remove, test, inspect, and replace any such anti-fluctuator at all reasonable times; such taking off, removal, testing, inspecting, and replacing to be done at the expense of the Company, if the anti-fluctuator be found in proper order, but otherwise at the expense of such consumer.

The Southend-on-Sea Gas Bill is to enable the Company to acquire additional lands and construct a jetty, within seven years, in place of a similar work authorized by their Act of 1892. The existing capital of the Company is to be consolidated into a uniform 5 per cent. stock. New capital to the amount of £100,000, bearing a 5 per cent. ordinary or a 4 per cent. preference dividend, is required; with borrowing powers to the extent of one-third of the amount issued. The sliding-scale is to be adjusted to the new stock conditions. Power is sought to provide and maintain electricity generating stations upon the gas lands; and also to take over the Electric Lighting Order of the Corporation.

The Swansea Gas Bill is to enable the Company to acquire additional lands and to consolidate their capital upon a 5 per cent. basis. Additional capital to the amount of £120,000 is required, to carry a 5 per cent. ordinary or a 4 per cent. preference dividend. The borrowing powers are to be one-third of the amount of the total capital stock. The rate of interest on consumers' deposits is to be reduced to 4 per cent.

The Thanet Gas Bill is to authorize the acquisition of additional lands and the construction of new gas-works at Margate. The capital is to be converted into 3½ per cent. consolidated stock; and £100,000 of fresh capital bearing a similar dividend is required. Consumers are to have the same priority as existing shareholders in bidding for new issues of stock. The borrowed capital is to be one-third of the amount of the stock issued and paid up. Permission is sought for taking over the Electric Lighting Order of the Corporation and carrying it out; but a separate capital account is to be kept. General powers of amalgamation are sought in regard to other Thanet gas undertakings belonging to Companies.

The Tottenham and Edmonton Gas Bill is to convert and consolidate the existing capital of the Company upon a 5 per cent. basis; and to sanction the raising of £240,000 of additional capital bearing a 5 per cent. ordinary or a 4 per cent. preference dividend. One-third of the amount of the new capital is to be borrowed. Mortgages are to come under the auction clauses. General electric lighting powers are sought, subject to the approval of the Board of Trade and the Local Authority. The clauses of an ordinary Electric Lighting Order are included in the Bill.

The City of Waterford Gas Bill is to consolidate the existing capital of the Company, and enable them to raise £80,000 of additional capital upon a 5 per cent. basis. The standard price for gas is to be 4s. 9d. per 1000 cubic feet. Electric lighting

facilities are sought. New stock issues are to be offered in the first place *pro ratâ* to consumers, whose holdings are only to be transferable among consumers.

The Yeovil Gas Bill is to incorporate a Company originally formed in 1833, and now having a capital of £20,000 with no mortgage debt. The capital is to be converted into £40,000 of consolidated 5 per cent. stock, with power to raise an additional amount of £30,000 to bear a 5 per cent. ordinary or preference dividend, with the usual borrowing powers. The maximum price of 15-candle gas is to be 4s. per 1000 cubic feet.

The York Gas Bill is to convert the capital of the Company into a consolidated 4 per cent. stock, with power to raise £90,000 of additional capital bearing the same rate of dividend. Authority will be sought to borrow to the extent of one-third of the amount issued.

PERSONAL.

M. Le Chatelier has been nominated by the Minister of Public Instruction to the chair of Inorganic Chemistry in the College of France.

Mr. W. A. Schultz, F.C.A., has been appointed Secretary of the Ascot District Gas Company, in succession to Mr. W. Liddall, whose resignation took effect on the 31st ult.

The Bradford City Council last Tuesday unanimously adopted the resolution of the Gas and Electricity Committee appointing Mr. Charles Wood, the Deputy Gas Engineer, to the office of Chief Engineer.

Herr von Hefner-Alteneck, whose name is associated with the amyl-acetate standard of light, has been awarded an honorary degree of Doctor of Philosophy by the University of Munich, in recognition of his services to modern electrotechnics.

Mr. C. R. Bellamy, the Superintendent of the Gas and Lighting Department of the Liverpool Corporation, and Mr. F. G. Cockey, the Engineer and Manager of the Newport (I.W.) Gas Company, have been elected associate members of the Institution of Civil Engineers.

Mr. Octavius Thomas has been appointed Manager of the gas and water works of the Rhondda Urban District Council—a position for which applications were invited in the "Journal" a few weeks since. Mr. Thomas was a pupil of the late Alderman H. Bowen at Cardiff, and afterwards assistant for several years to Mr. H. Morley, M.Inst.C.E., the Engineer and Manager of the Cardiff Gas-Works. He has been General Manager and Secretary of the Western Valleys (Mon.) Water and Gas Company for four and a half years.

The employees at the Great Grimsby Gas-Works testified their high appreciation of the foreman, Mr. Sayner, and his wife, by presenting them with a silver urn, on the occasion of their silver wedding, on the 8th inst. The presentation was made by the Engineer (Mr. W. Drewry), who said it was a pleasing duty for him to perform, because of the faithful service rendered by Mr. Sayner, and the kindness he had shown to all. He hoped he and Mrs. Sayner would live long to enjoy the gift. Mr. Sayner, in reply, said he was pleased to think he had won the good wishes of the workmen. On behalf of Mrs. Sayner and himself, he thanked them for their present, and expressed the hope that there might be the same good feeling in the future that had existed in the past.

The Absorption of Artificial Light by Fog.—It is reckoned that London fog absorbs about 11·1 per cent. of the luminous rays from an ordinary gas-flame, and 20·8 per cent. of the light yielded by an incandescent mantle.

The Dividend of The Gaslight and Coke Company.—We learn from the Secretary and General Manager of The Gaslight and Coke Company, Mr. J. W. Field, that the accounts for the past half year show that (subject to audit) the balance to the credit of the net revenue account is £302,483 16s. 9d., which, together with £74,519 8s. 6d. to be withdrawn from the reserve fund, will enable the Directors to recommend the payment of a dividend at the statutory rate of 12¾ per cent. per annum.

The Metropolitan Water Commission.—The Commission met again for the fourth time yesterday, in the Moses Room of the House of Lords—Lord Llandaff presiding, and all the Commissioners being present. The Chairman announced that the Commission would sit on the following day. Evidence was given by Sir Alexander Binnie, the Chief Engineer to the London County Council. He said he had devoted attention for many years to the question of the water supply of London, and the various schemes brought forward. He adduced a mass of facts and figures bearing upon the population of the Administrative County of London, the "Outer Ring," and Greater London; also in regard to the areas, &c., of the various Water Companies. Replying to a question which had been put to Mr. Cripps at a previous sitting, and postponed, he said that the principal instance of two Companies actually supplying in competition in the same district was that of the Southwark and Vauxhall and the Lambeth Companies. He defined the district so served, which covers a total area of practically two square miles. We shall continue next week our usual report of the proceedings.

NOTES.

Smoke Abatement in Philadelphia.

The movement recently inaugurated in Philadelphia for reducing the smoke nuisance has had the effect of making American engineers acquainted with what has been done in England in this regard. Among other expedients, automatic stokers for steam-boilers have received more attention than had been previously considered necessary; and an important local engineering firm adopted the well-known Vicars automatic mechanical stoker—making this useful appliance the subject of a Franklin Institute lecture. At a time when the asserted superiority of much American mechanical engineering to the English practice is a commonplace of industrial journalism, it is refreshing to meet with an example of American adoption of an English device, on the plain ground that it was likely to be the best solution of the particular problem. Thus it came about that the Vicars automatic boiler stokers went to America, where they had to be adapted to suit the local conditions; one of these being the great variety of size and pattern of the steam-boilers used in America. A full illustrated account of the various devices submitted for curing the smoke nuisance in Philadelphia is at the present time appearing from month to month in the "Journal" of the Franklin Institute; but so far nothing new in this way has transpired.

Points of School and Office Building Design.

Some interesting points concerning the planning and building of high schools (some of which are applicable to office buildings) came out at a recent meeting of the Architectural Association, at which a paper on this subject was read by Mr. J. Osborne Smith. Among other matters, warming and ventilation were intelligently dealt with by the author, who urged that open fireplaces should not be abandoned without very full and serious consideration, though if there are two or more external walls it is sometimes found desirable to supplement the fireplace with hot-water pipes under the windows. The practice of arranging these pipes in channels below the floor of the spaces to be warmed, with open gratings above them, is denounced as "unnecessary, wasteful, and dangerous, because of the difficulty of keeping the pipes and channels free from foul matter from boots and floors. Enclosing hot-water coils in ornamental casings is objectionable for the same reason." Mr. Banister F. Fletcher, in discussing the paper, remarked that as to the flooring of buildings of the kind in question, there is so little difference of cost between coke-breeze concrete and ordinary combustible timber floors, that the former should always be chosen. Mr. Smith, on the other hand, thought coke-breeze floor construction more expensive than timber; but he did not say how much.

The Commercial Production of Oxygen.

For some time past little or nothing has been heard of new methods for the commercial production of oxygen. It is reported, however, in the "Journal de Pharmacie et de Chimie," by MM. Dutremblay and Lugan, that they hope to re-introduce, with improved apparatus and methods, the process proposed and tried by Tessié du Motay in 1867, but since abandoned. The principle of this process, as is well known, consisted in decomposing alkaline manganates by means of superheated steam at 500°; the charge being restored to its original composition after every such operation by merely subjecting it to a current of dry purified air. The apparatus required for working the process is: An air-pump; a purifier and drier, to remove carbonic acid and moisture; an automatic distributor, to introduce steam and air alternately into the retorts; and a gasholder. The reactions take place at a low pressure; and as the oxygen is carried into the gasholder by means of the steam, instead of through a pump, it is kept perfectly free from carbides. The authors claim to have rectified the old disadvantages of the caking of the charge and the evaporation of soda; and they declare that there is now no risk of explosions occurring in the apparatus. The proof of the reliability of this new claim to the credit of conquering the disadvantages of a tantalizing process will be keenly scrutinized.

A Pneumatic Pyrometer.

A pneumatic pyrometer for accurately and continuously indicating high temperatures has been made by the Nehling and Steinbart Company, Limited, of New York. The principle involved is the law of the passage of gases under a constant forced flow through small apertures. In the design of a method of realizing this law, the prime feature is the forcing of air or gas through two small apertures in succession, so that the tension between them will remain constant so long as the temperature of the flowing fluid remains equal and constant at both apertures; while a change of temperature at either one or other of the apertures will also cause a change of tension between them. If, therefore, the fluid as it passes through one of these apertures is made to vary with the temperature to be measured, while at the other it is constantly kept at a certain normal temperature, the variation of the tension between the apertures will be a measure of the degree of heat the air has at the time of entering into the space between and connecting the two apertures. Hence the temperature will be measured. The degree of accuracy of the instrument is not stated; but a Sub-Committee of the Franklin Institute have reported that the

principle on which this pyrometer acts is theoretically correct, and has not heretofore been applied to this purpose. They also report that the instrument in actual use is very satisfactory.

"Allaxic" Flash Advertising.

It is possible that some order may be taken by authority to abolish the illuminated advertisements that have of late become so marked a feature of the evening prospect in towns. Meanwhile, the ingenuity that has been expended in the design of this kind of advertising device may be recognized even by those who regard such efforts as misdirected, and their result most deplorable. The latest "improvement" in this branch of the engineering of artificial lighting is due to Mr. J. T. Gent, of Flushing, Falmouth, and has the object of varying the order in which illuminated letters, display-pieces in shop windows, and the like, are lit up. It has always been the failing of set-pieces in illuminations that when once lit up they remained irritatingly quiet, and consequently ceased after a while to arrest attention. This defect is entirely removed by Mr. Gent's so-called "allaxic" system of arranging the lighting up, which presents to the observer a maddening irregularity in this regard. The illuminated device is being continually lit up and extinguished; but there is nothing novel in this. Mr. Gent's triumph consists in so actuating his gas-valves or electricity switches that nobody can tell which letter or part of the device is going to be lighted up next. Anything better calculated to arrest the traffic of a busy thoroughfare can hardly be conceived. We cannot find space for describing how this erratic movement is effected. It is possible that in connection with illuminations the plan may prove as attractive and harmless as it is unquestionably ingenious.

Tests of Rubbish Destructors in Berlin and Paris.

In connection with the claims made on behalf of refuse destructors as aids to the economical generation of steam for electric lighting purposes, reference may be made to the condensed report furnished by Mr. Rudolph Hering to the "Engineering Record" as to the results of refuse destruction in Berlin and Paris. The material consumed consisted of house refuse, as it was collected. A special staff of observers was employed to note the results of a period of experimental working of Horsfall and Warner destructors over a period of eighteen months. Soon after the experiments commenced, it was found that the Berlin refuse would not burn without the addition of some fuel; and coke was added at first, on account of its smokelessness. Ultimately, bituminous coal was found to act equally well. It was ascertained that, in general, the refuse burnt much more readily in summer than in winter. A dry air-blast greatly improved the working of the furnaces; and the occasional addition of a little coal made all the difference between success and failure in burning. In England, and also in Hamburg, the burning garbage will produce enough steam to operate the works. In Paris there was not sufficient heat produced to generate any steam; and it was the same in Berlin. It is not true that the destruction of house refuse in this way gets rid of the expense of cartage out of the town, because there always remains from 35 to 50 per cent. of the original weight of material to get rid of in the form of clinker and ashes.

Reports of Gas Associations for 1897.—By an announcement which appears elsewhere, our readers will see that the above-named work is now ready. The papers read at the meetings reported are illustrated, where necessary, by diagrams, as well as by plates. The text is followed by the usual lists of office-bearers and members; and there is an index. The book presents in a convenient form for reference a record of the work done last year by the various Provincial Associations, and is thus a companion volume to those issued by the two London Institutes.

A Non-Explosive and Fireproof Incandescent Gas-Lamp.—By the combination of two great inventions, a gas-lamp has been produced which not only yields a light of high illuminating power, but supplies a perfectly safe means of lighting in factories and workshops where inflammable or explosive vapours may abound in dangerous quantities. The lamp is manufactured by Messrs. Falk, Stadelmann, and Co., Limited; and it is simply in the application of the principle of the Davy safety lamp to the incandescent gas-light that its efficacy lies. An ordinary incandescent burner is enveloped in a cylindrically shaped glass formed with an oval bottom, in which is an aperture for the burner-stem. On the latter is fitted a gallery for the support of the globe; but no air is permitted to pass into the lamp at this point. The top of the lamp consists of a metal dome and chimney, both of which are partly constructed of wire gauze. The air required for the burner obtains admission through the wire gauze in the dome; and, consequently, in travelling downwards, between the burner chimney and the globe, it becomes highly heated. The lamp has undergone some severe tests to prove the claims of the patentee that it is non-explosive and fireproof in atmospheres heavily charged with inflammable vapours; and at the show-rooms of the makers anyone interested can witness—as did a "JOURNAL" representative a few days since—a sufficiently convincing experiment. Within a wooden chamber is fixed one of the lamps. This is lighted; and by means of a pipe passing in at the bottom of the chamber, a supply of coal gas is admitted into it. The light (which is visible by the aid of a paper covered opening in front of the chamber) quickly becomes dim, and in a few seconds is totally extinguished.

TECHNICAL RECORD.

THE INCORPORATED INSTITUTION OF GAS ENGINEERS AND THE STANDARD OF LIGHT.

First Report of the Committee on the Proposed Standard of Light and the Temperature of Gas Measurement.

It will be remembered that at the annual meeting of the Incorporated Institution of Gas Engineers in May, 1896, a Committee, consisting of Messrs. A. Colson, C. C. Carpenter, C. Hunt, F. Livesey, J. Methven, R. O. Paterson, G. C. Trewby, and L. T. Wright, was appointed to "investigate and report at a subsequent meeting upon the proposed standard of light and the relation of gas measurement to temperature." The Committee, of which Mr. Hunt is the Acting Chairman, have issued their first report, and we have received a copy from the Secretary of the Institution (Mr. T. Cole). It is signed by all the members with the exception of Mr. Lewis T. Wright, who, having left the Institution, relinquished his place upon the Committee. The following is the text of the report:—

Your Committee report that at their first meeting, held on June 11, 1896, all the members being present, it was resolved that independent experiments with the 10-candle Dibdin standard should be made by members of the Committee, five of whom undertook this work. Their experiments are distinguished in this report by the letters A, B, C, D, and E.

The claims made on behalf of the proposed standard, and the objections urged against it, are tabulated as under:—

*Claims for the Standard.**	*Objected by Mr. L. T. Wright.†*	*Objected by Mr. J. Methven.‡*
1.—That it is of the value of 10 standard sperm candles.	..	That it is 3 to 5 per cent. too high in value.
2.—That the standards can be made practically identical with one another.	That the standards vary in value with the situation in which they are used; the simple transposition of a standard from one side to the other of a photometer may greatly alter its value.	
3.—That the value of the standard is unaltered when its flame varies from ½ inch below to 1½ inches above the prescribed height of 3 inches.	That the light from the standard is seriously affected by variations in the height of flame.	That a 3-inch flame should at all times be used, any variation altering its amount of light value. (Letter to C. Hunt.)
4.—That coal gas may be substituted for air as a carrier of the pentane vapour without altering the value of the standard.	That coal gas cannot be accepted as the equivalent of air as a carrier of the pentane vapour.	
5.—That the value of the standard is unaffected by change of temperature.	That the light is seriously affected when the temperature of the carburetter approaches 90° Fahr.	That with a variation of 22-23 degrees in temperature there is a difference of 13½ per cent. in the amount of light emitted.
6.—That the depth of pentane in the carburetter may be anything from ¾ inch to 2·4 inches without affecting the value of the standard.		
7.—That if care be not taken in the selection and the centering of the chimneys, a slight error of perhaps 2 to 5 per cent. is possible.	..	That the same portion of the chimney should always be placed between the flame and the screen. (Letter to C. Hunt.)

Mr. Methven also suggests that 20 minutes should be allowed to elapse after the adjustment of the position of the standards in the photometer before commencing readings—a condition which was observed throughout the experiments which are herein summarized, as was also his suggestion that the same portion of the chimney should be placed between the flame and the screen.

Claim 1.

It has appeared to your Committee that the first question to be determined is the variability or otherwise of the standard as a standard of light; but experiments extending over twelve months have been made by one member of the Committee, which prove that the Dibdin standard No. 586 returns a lower value for the gas by about nine-tenths of a candle than was obtained from candles used with the same photometer.

* See report of the Photometric Standard Committee to the Board of Trade, "JOURNAL," Vol. LXV., p. 1010.

† See "JOURNAL," Vol. LXVII., p. 1096.

‡ *Ibid.*, p. 1101; also p. 225.

Claim 2.

An investigation of this claim has been the object of a large number of experiments; each operator being furnished, partly by a system of interchange, with three or more certified standards. Thus A having two standards, borrowed a third from E, returning this on completion of his experiments, and lending one of his own to B; B in turn lending one of his to C; and so on.

A.

Each result is the mean of 30 observations made by three observers, each making ten.

Burner 219 tested by burner 220 gave 10·24 candles.

,,	219	,,	202	,, 10·31	,,
,,	220	,,	219	,, 9·81	,,
,,	220	,,	202	,, 10·00	,,
,,	202	,,	219	,, 9·99	,,
,,	202	,,	220	,, 10·22	,,

Taking 202 as the light of comparison } 219 : 220 : : 10 : { 9·77 when the standard of comparison was placed at the left terminal of the bar. 9·70 when at the right.

Taking 220 do. . . 219 : 202 : : 10 : { 9·81 when the standard of comparison was placed at the left terminal of the bar. 9·98 when at the right.

Taking 219 do. . . 220 : 202 : : 10 : { 9·93 when the standard of comparison was placed at the left terminal of the bar. 10·18 when at the right.

Showing a maximum difference of 0·30 candle, or 3 per cent., between two standards. A series of six experiments made to ascertain the effect of changing or reversing the carburetters gave a maximum difference due to this cause of 1½ per cent.

B.

In these experiments, four certified standards were used, and each was compared with the others at both ends of the photometer bar. Thus standards 227 and 219 were first compared—227 on the right and 219 on the left; 219 was then replaced by 213, and the latter by 224. The standard on the right—viz., 227—was then replaced in turn by 219, and in turn by 213; followed by the substitution of 227 and 219 in place of 224 on the left; and so on.

—	Standard of Comparison at the Left of Bar.	Standard of Comparison at the Right of Bar.
Taking as the light of comparison—	Relation of	Relation of
219	227 is, as 10·00 : 213 & 224 9·82 : 10·25	227 is, as 10·00 : 213 & 224 9·93 : 10·12
213	227 ,, 10·00 : 219 & 224 10·00 : 10·04	227 ,, 10·00 : 219 & 224 10·27 : 10·17
224	227 ,, 10·00 : 219 & 213 10·07 : 9·81	227 ,, 10·00 : 219 & 213 10·01 : 9·83
227	224 ,, 10·00 : 219 & 213 10·12 : 9·74	224 ,, 10·00 : 219 & 213 10·06 : 9·85

Showing a maximum difference of 0·43 candle, or 4·3 per cent. Each figure in the above table represents an average of two or more tests of ten observations per test.

Experiments were also made to determine the value of the standards by the method of substitution when using two carburetters only for the whole series of experiments. These were fixed at the terminals of the bar, and the standards placed upon them in succession as before described.

—	Standard of Comparison placed at the Left Terminal of Bar.	Standard of Comparison placed at the Right Terminal of Bar.
Taking as the light of comparison—	Relation of	Relation of
219	227 is, as 10·00 : 213 & 224 9·95 : 10·04	227 is, as 10·00 : 213 & 224 10·02 : 9·97
213	227 ,, 10·00 : 219 & 224 10·19 : 10·10	227 ,, 10·00 : 219 & 224 10·03 : 9·90
224	227 ,, 10·00 : 219 & 213 10·16 : 9·91	227 ,, 10·00 : 219 & 213 9·97 : 9·82
227	213 ,, 10·00 : 219 & 224 10·32 : 10·03	213 ,, 10·00 : 219 & 224 10·09 : 9·92

Showing a maximum difference of 0·32 candle, or 3·2 per cent., between two standards.

In the above experiments it was observed that two standards when compared did not give from day to day the same results, although the results obtained on each occasion were in close agreement. Careful research has failed to discover any external cause for such variations. Thus, when 227 and 219 were compared, 227 on the right and 219 on the left, the following variations in the light-value of No. 227 were observed on four different occasions:—

(1) 9·80, 9·85, 9·89, 9·85, and 9·87.
(2) 10·05, 9·97, 9·98, 9·91, 9·96, and 9·98.
(3) 9·80, 9·84, 9·82, and 9·89.
(4) 10·05, 10·09, and 10·02.

Showing a maximum variation of 2·9 per cent.

C.

Taking 213 as the light of comparison } 222 : 221 : : 10 : { 9·72 when the standard of comparison was placed at the left terminal of the bar. 9·69 when at the right.

Taking 221 do. . . . 222 : 213 : : 10 : { 9·53 when the standard of comparison was placed at the left terminal of the bar. 9·65 when at the right.

Taking 222 do. . . . 221 : 213 : : 10 : { 9·78 when the standard of comparison was placed at the left terminal of the bar. 9·95 when at the right.

Showing a maximum difference of 0·47 candle, or 4·7 per cent.

D.

Taking 586 as the light of comparison } 222 : 223 : : 10 : { 9·84 when the standard of comparison was placed at the left terminal of the bar. 9·85 when at the right.

Taking 223 do. . . . 222 : 586 : : 10 : { 9·99 when the standard of comparison was placed at the left terminal of the bar. 9·99 when at the right.

Taking 222 do. . . . 223 : 586 : : 10 : { 10·24 when the standard of comparison was placed at the left terminal of the bar. 10·22 when at the right.

Showing a maximum difference of 0·24 candle, or 2·4 per cent. The results obtained by interchanging the carburetters were practically the same; indicating that no difference occurred with different carburetters.

E.

Taking 217 as the light of comparison } 202 : 223 : : 10 : { 9·77 when the standard of comparison was placed at the right terminal of the bar. 9·73 when at the left.

Taking 202 do. . . . 217 : 223 : : 10 : { 10·27 when the standard of comparison was placed at the right terminal of the bar. 9·99 when at the left.

Taking 223 do. . . . 202 : 217 : 10 : { 9·70 when the standard of comparison was placed at the right terminal of the bar. 9·91 when at the left.

Showing a maximum difference of 0·30 candle, or 3 per cent. A series of experiments made to ascertain the effect of changing the carburetters of the standards, gave a maximum difference due to this cause of 1 per cent.

Taking the averages of the experiments included in the foregoing summaries, it may be calculated that if standard No. 213 be of the value of 10 candles, the remaining standards will possess the following values:—

213	219	227	224	220	202	221	222	223	586	217
10·0	10·26	10·15	10·26	9·99	10·15	10·14	10·43	10·26	10·42	10·03

Claim 3.—B.

Value of one of the Standards when the Flames of both were maintained at the Normal Height.	Value of the same Standard when its Flame was maintained ½ Inch Low.	Error due to Lowering of Flame.
9·92	9·31	−0·61
10·04	9·72	−0·32
9·54	9·24	−0·30 Standard supplied with gas instead of air.
10·15	9·77	−0·38
9·91	9·51	−0·40, or 4 per cent.

Value of the same Standard when its Flame was maintained ½ Inch to 1 Inch High.	Error due to Raising the Flame.
9·97	+0·05 ½ inch high.
10·02	−0·02 do.
9·41	−0·13 Standard supplied with gas (flame 1 inch high).
10·16	+0·01 do.
9·89	−0·02, or 0·2 per cent.

E.

			217	223
217 flame about ½ inch low ..	223	flame about ½ inch low .	1	1·025
		,, normal	1	1·020
		,, about ½ inch high .	1	1·015
217 ,, normal	223	,, ,, ,, low .	1	1·025
		,, normal	1	1·020
		,, about ½ inch high .	1	1·020
217 ,, about ½ inch high ..	223	,, ,, ,, low .	1	1·030
		,, normal	1	1·030
		,, about ½ inch high .	1	1·025

Claim 4.—B.

Value of one of the Standards when both Standards were supplied with Air.	Value of the same Standard when Gas was substituted for Air in its case.	Error caused by supplying Gas to one Standard.
9·94	9·53	−0·41
9·99 (Average of two experiments.)	9·54	−0·45
9·84 (Average of four experiments.)	9·42 (Average of two experiments.)	−0·42
10·20 (Average of two experiments.)	10·04	−0·16
9·86	9·76	−0·10
9·99	9·82	−0·17
10·25	10·01	−0·24
10·01	9·73	−0·28, or 2·8 per cent.

Claim 5.—B.

The carburetters of two standards were immersed in water-baths, and left for about an hour, when their lights were compared. By increasing the temperature of one carburetter, the temperature of the other carburetter remaining as before, the value of the standard was found to be reduced.

Claim 7.—B.

A great number of experiments were made to ascertain to what extent, if any, the placing of different portions of the chimney between the flame and the screen affected the value of the standards. These showed that with three of the standards used in the experiments no material variation resulted from changing the chimney, or placing different portions of them between the flame and the screen. Using, however, the fourth (224) standard with the chimney in any other position but that with its trade mark at the back of the flame, and employing the method of substitution, the maximum difference in value between the standards was increased from 4·2 to 6·6 per cent.

SUMMARY.

It appears from the experiments made by your Committee that—

1.—The proposed standard is of greater value than ten standard sperm candles; and two such standards may differ considerably in value, which difference may be materially increased if special care be not taken in the selection of suitable chimneys for the burners. Also, two such standards when compared do not give from day to day the same results, notwithstanding that results obtained at any one time may be in very close agreement.

2.—The light-value of the proposed standard varies when the standard is removed from one end of the photometer bar to the other. The light-value is also altered when the normal height of flame is not maintained, and is affected by change of temperature.

3.—Coal gas cannot be substituted for air as a carrier of the pentane vapour without altering the light-value of the standard.

4.—Serious variations in the light-value of the standard may result from the want of special care in the selection of the chimney, which not only requires to be standardized with the burner, but to be always used in the same relative position as regards the disc.

CHAS. HUNT, *Acting Chairman.*

CHAS. C. CARPENTER. JOHN METHVEN.
ALFRED COLSON. R. O. PATERSON.
FRANK LIVESEY. G. C. TREWBY.

Dec. 1, 1897.

THE COMPARATIVE COST OF COMMON SOURCES OF LIGHT.

An interesting series of tables recording the results of tests made on the commoner sources of artificial light was presented by Herr W. Wedding to a meeting of a German Industrial Association in November last. The tables have been published in the "Chemiker Zeitung," and from them the annexed table is compiled. It is not clear from our German contemporary's text whether the "candle," in terms of which the illuminating powers are expressed, is the standard German paraffin candle (equal to 1·05 English standard sperm candles) or the Hefner unit (equivalent to 0·877 English standard sperm candle); but probably it is the latter. Provided the results are considered *en bloc*, the precise value of the unit of illuminating power is of no great moment. The table is based on the calorific values and prices shown below:—

	Calorific Value.	Price.
Coal gas	141½ cal. per cubic foot	4s. 6d. per 1000 c. ft.
Spirit	3175 " pound	1s. 7d. per gallon.
Petroleum	4990 " "	10·9d. "
Acetylene	5443 " "	42s. 6d. per 1000 c. ft.
Electrical energy	—	7·2d. per 1000 watt-hours.

Calcium carbide for the production of acetylene is assumed to cost about £22 17s. 6d. per ton, and to yield about 4·8 cubic feet of acetylene per pound. In computing the mean hemispherical illuminating power, a period of 300 burning hours is taken, as both mantles and electric glow lamps are supposed to need renewal at the expiration of this time.

Cost of Light from Various Sources.

Illuminating Agent.	Burner or Lamp.	Illuminating Power (in Practical Use).	Consumption of Illuminating Agent per Hour.	Heat Expended.	Cost per Burning Hour.	Mean Hemispherical Illuminating Power in Candles.				
						Unprotected Light.	Light protected by—			
							Opaline Shade.	Opal Globe.	Tulip.	Globe.
		Candles.	Cub. Ft.	Calories.	Pence.					
Coal gas	Flat-flame	30	14·09	1995	0·768	20	..	..	..	..
"	Argand	20	7·06	1000	0·384	13	18	18	16	12
"	Regenerative	111	14·41	2042	0·780	..	111	..	..	..
"	Incandescent	50	3·53	500	0·192	29	40	39	34	26
			Cub. In.							
Spirit	"	30	3·48	318	0·240	15	21	20	18	13
Petroleum	½-inch burner	30	6·57	960	0·264	20	28	27	24	18
"	Incandescent	40	3·05	550	0·120	20	28	26	23	18
			Cub. Ft.							
Acetylene	..	60	1·27	534	0·264	40	56	..	..	..
			Watts.							
Electricity	Incandescent	16	48	41·4	0·348	14	20	19	17	13
"	Arc	600	258	222	1·860	600	..	400	..	..

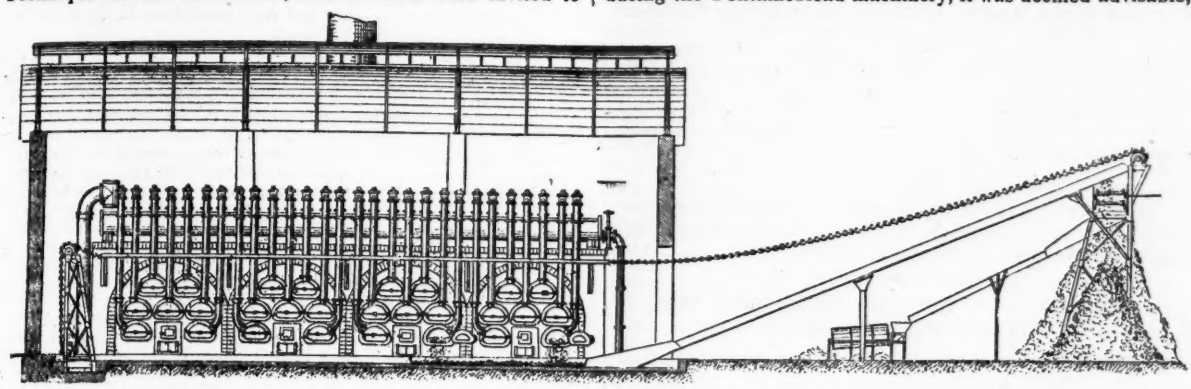
Herr Wedding pointed out that for practical purposes many factors which did not come within the scope of his tables must be taken into account. For the illumination of large halls and extensive spaces, he considered the electric arc light pre-eminently suitable, and far less costly than other methods of lighting affording equal illuminating power. The fragility of mantles obstructed the use of portable incandescent lamps, and therefore militated against the employment for lighting purposes of spirit, which is a native product in the German Empire. The use of petroleum was deemed to be objectionable because it was an imported article; while in incandescent lamps the fragile nature of the mantles was also against it.

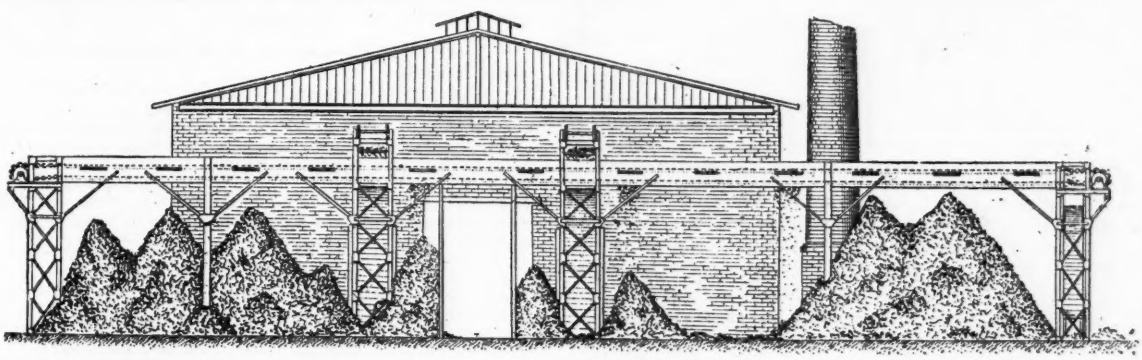
The table given above comprises all the results tabulated by Herr Wedding; but since he did not show the cost per candle power of light from the various sources, this has been deduced from his figures, and the results are given in the following table. It brings into greater prominence the economy of gas lighting, especially when the incandescent burner is employed—an economy which is somewhat obscured in the original tables. Moreover, the saving would be considerably greater in this country where gas rarely costs so much as 4s. 6d. per 1000 cubic feet, which is the price on which the computations are based. For the sake of completeness, the heat expended per 1000 candle-hours has also been deduced from Herr Wedding's figures, as tabulated above.

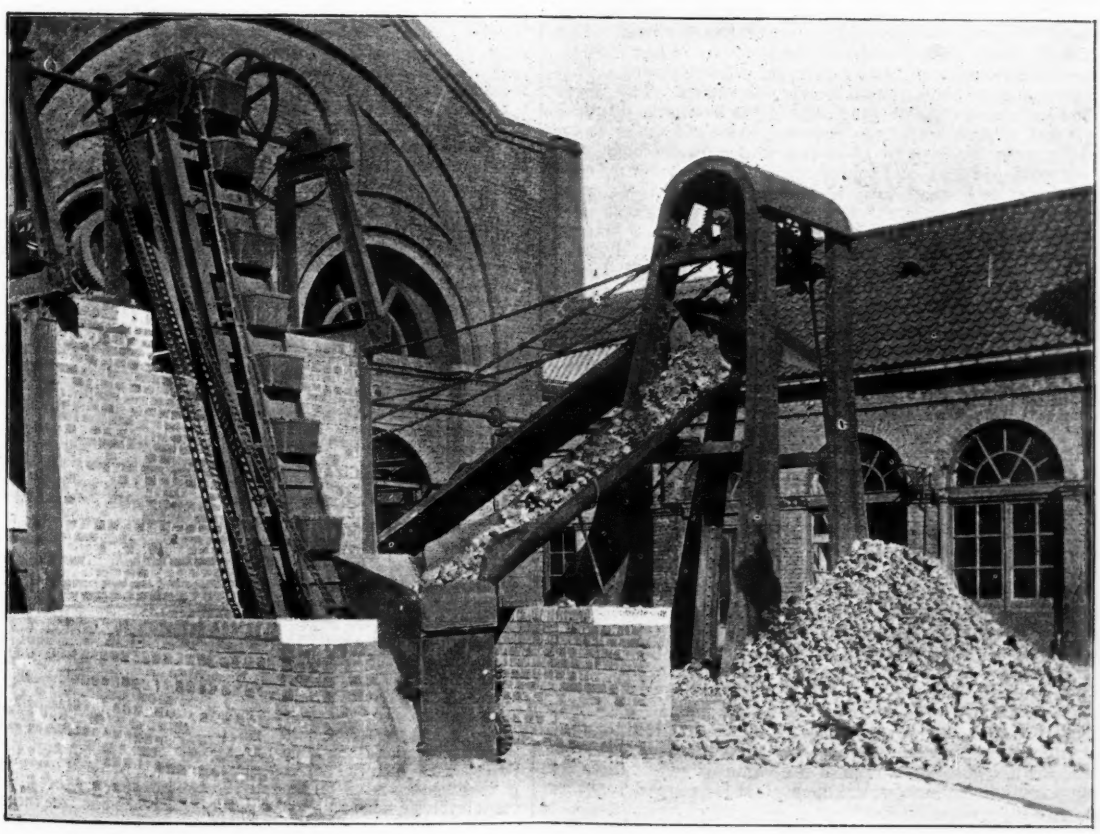
Illuminating Agent.	Burner or Lamp.	Heat Expended per 1000 Candle-Hours.	Cost of 1000 Candle-Hours.
		Calories.	s. d.
Coal gas	Flat-flame burner	66,500	2 1·60
"	Argand "	50,000	1 7·40
"	Regenerative "	18,400	0 7·03
"	Incandescent "	10,000	0 3·84
Spirit	Incandescent lamp	10,600	0 8·00
Petroleum	½-inch ordinary burner	32,000	0 8·80
"	Incandescent lamp	13,750	0 3·00
Acetylene	..	8,900	0 4·40
Electricity	Incandescent lamp	2,600	1 9·75
"	Arc light	370	0 3·10

DE BROUWER'S COKE QUENCHING AND CONVEYING MACHINERY.

In previous issues of the "JOURNAL" (see Vol. LXVII., p. 23, and Vol. LXVIII., p. 1235), we described and illustrated the appliance devised by M. de Brouwer, of Bruges, for conveying incandescent coke from the retorts, extinguishing it, and finally depositing it in the store or elsewhere. In the earlier number, a general view of the arrangement was given; and in the later one, an abstract of the English specification. The machinery has been introduced into the gas-works at Fontainebleau and at St. Quentin; and on the occasion of the last congress of the Société Technique du Gaz en France, the members were invited to inspect it at the former place. The installation is shown in the accompanying outline diagrams, which are reproduced from the current number of the "Journal des Usines à Gaz;" the conveyor as fitted up at Bruges being shown by the photograph. In front of the retorts, there is a metal or masonry channel into which the coke is drawn. In the channel work two endless chains, carried along by toothed wheels or rollers; and a water-spray pipe is arranged at the side. The coke is carried up the incline shown to a horizontal distributor placed about 13 feet from the ground. The bottom of the distributor is provided with traps which allow the coke to fall on to the heap, or if they are kept closed, it is conveyed by another channel to the breaker. It will be seen that after the coke is drawn from the retort it is taken to its destination without being handled. When introducing the Fontainebleau machinery, it was deemed advisable,







in order to realize the fullest economy from it, to make some alteration in the stokers' method of working; and it was decided to unlute all the retorts of the same charge by putting a man to each. The conveyor being strong enough to carry away all the coke falling into the channel, the coke will be extinguished and removed at the rate at which the retorts are drawn. For six retorts, as at Fontainebleau, the time required is five minutes. The drawing done, the conveyor is stopped, and the retorts are again charged with the scoop. This operation takes 12 minutes; making 17 minutes altogether, as compared with 35 minutes under the previous arrangement with three men—an economy of 50 per cent.

At St. Quentin, the general arrangement is somewhat different. There is a conveyor before each bench of retorts. The quenched coke is thrown into a receptacle, whence it is removed by another conveyor to the breaker, which is equal to dealing with all the coke as produced. From the breaker a bucket-chain raises the broken coke to a height of 23 feet, at which a sorter allows it to fall into different compartments according to size. Each compartment is provided at its lower extremity with a hopper, which feeds a balanced hectolitre measure. In order to "sack" the coke, a trap is opened, the coke drops into the measure, and by a simple manipulation of the balance the trap is closed and the sack is filled. From the time the coke leaves the retorts until it is in the sack it is not touched by a single workman. The whole of the operations are mechanical. Both at St. Quentin and at Fontainebleau, it is found that about 1-horse power is required for each 40 feet length of channel.

GAS-ENGINES v. ELECTRIC MOTORS FOR THE TRANSMISSION OF POWER.

The President of the Manchester Association of Engineers (Mr. H. Webb), in the course of his Inaugural Address to the members at their annual meeting last Saturday, referred to the question of the exceptional adaptability of gas-engines for the transmission of power under special conditions.

He remarked that some people are under the mystic influence of the word "electricity," and are applying it in many directions without sufficient thought being given to other means of power. A favourite illustration is the use of electricity in running (say) a special tool at night for a breakdown job; thus avoiding running the line shafting of the shop. This is undoubtedly good, but there are needed a boiler, steam-engine, dynamo, motor, and attendant for the boiler and engine, in addition to the man at the machine. Mr. Webb asked whether, in first cost and in cost of working, a gas-engine would not be better. No extra attendant is required, and the gas would not be more costly than the steam.

Mr. Webb expressed his indebtedness to Mr. A. R. Bellamy, of Messrs. J. E. H. Andrew and Co., Limited, for tests which he had made specially to illustrate this part of the address. Mr. Bellamy said: "The engine which drives our shop is one of our modern 'Stockport' engines, working with fuel gas, and is capable of giving a maximum of 35 brake horse power. The power to drive the engine itself with main belt, 40 feet long by 9 inches wide, running on loose pulley, is 6·2-horse power. This would be considered the friction load of the engine. The power absorbed in driving the following shafting is 8·6-horse power—viz., 532 feet of line shafting in two long straight lengths, ranging in diameter from $3\frac{1}{2}$ to $1\frac{3}{4}$ inches, and with 80 bearings; together with 362 feet of countershafting, in 73 lengths, with 160 bearings, and 2000 feet of belting ranging from 2 to 5 inches wide. We have the following tools in constant use: 4 fly-wheel and pulley turning-lathes, 3 crank lathes, 8 planing and shaping machines, 3 cylinder-boring lathes, 9 drilling-machines, 5 milling-machines, 4 capstan lathes, 33 lathes (average 10-inch centres), 8 machines various kinds, and 7 grinding and emery stones—making a total of 84 tools. The actual horse power absorbed by the tools, working under ordinary conditions, is 14·4. The greatest maximum load that we can put on the engine—that is, by starting up some of the heaviest tools all together—is 22 actual horse power. At the same time, we have on our works six machines that we know take a 3 brake horse power engine to drive each of them under their worst conditions; and we have six others that take 2-horse power each. Summarizing the whole matter, our engine takes 6·2-horse power to drive itself with the main belt. The whole of the shafting, countershafting and belts absorb 8·6-horse power, and the tools themselves, 14·4-horse power. Supposing we were to adopt electric motors to drive each individual machine, we should have to put in 80. Six of them would have to be not less than 3 brake horse power each, and six of them not less than 2 brake horse power each, in order to start the machines under certain conditions; and we should have to drive the whole of these eighty motors for not more than 8·6-horse power, to be equal to what we are doing at the present. Apart from this, we should have to put down a motor somewhat larger than the actual power required for each machine; so that I am confident, instead of saving anything, we should lose considerably in friction loss, driving with motors as compared with our present system. I think our own shop is a splendid example of the value of gas-engines for driving our class of plant, where such plant is grouped together as we have it."

REGISTER OF PATENTS.

Drilling and Tapping Machines.—Errington, F. A., of Edgwater, N.Y., U.S.A. No. 28,253; Dec. 10, 1896.

This invention relates broadly to means to be employed in drilling and tapping machines for rotating a spindle in opposite directions, without in either case reversing the direction of rotation of the primary driving member of a gear-train; to means for bringing the opposite ends of the spindle to register alternately with the same point; to means for locking the spindle in axial alignment with the point; to means for readily connecting and disconnecting a cutting tool with the spindle; to means for regulating the respective distances of the outer ends of the cutting tools from the axis of the swivel-head; also to means for avoiding any breakage of the cutting tool when bottoming or under excessive strain. The invention relates, furthermore, to other details of improvement and combinations of parts set forth in a lengthy specification of more than seven pages of print, and then pointed out in the 48 claims with which the specification concludes.

Combined Internal Combustion and Compressed Gas and Air Engines.—Bryan, F., of Gunnersbury. No. 29,578; Dec. 23, 1896.

This invention relates to improvements in the use of compressed air or gases for obtaining power in conjunction with internal combustion engines; the object being to utilize the otherwise wasted heat produced by the explosion in a gas or other internal combustion engine "to supply the necessary heat to produce the most economical results, when compressed air or gases are allowed to produce power by expansion." In order to take advantage of this effect, the patentee has a cylinder, piston, and valves so arranged as to use one end of the cylinder as an ordinary single-acting gas-engine, while the other end of the cylinder is arranged as a single-acting compressed-air engine. The piston is driven in one direction by the force of the explosive mixture, and in the other by the expansion of the compressed air or gas. The heat given off by the explosion, and absorbed by the cylinder walls and piston, is again given out to and assists in raising the temperature of the air while expanding on the return stroke of the piston, when the cylinder walls previously exposed to the hot gases are exposed to the expanding and consequently cooling compressed air.

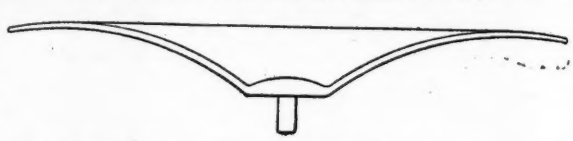
Incandescent Lighting.—Colas, C., of Rheims, France. No. 29,736; Dec. 24, 1896.

The object of this invention is to produce "a solid mantle or its equivalent" for an incandescent light—employing for the purpose kaolin and plastic clay, alkaline silicates, infusible and fusible salts, cements, plaster associated with the salts or metallic oxides, and even with foreign bodies, in certain proportions.

As examples of the proportions of ingredients used, the patentee gives the following mixtures: (1) Kaolin, 25 parts; enamel paste (as a binding material), 25 parts; oxides of thorium or alkaline earths, 50 parts. (2) Kaolin, oxide of thorium, clay, and enamel paste, 25 parts of each. (3) Kaolin, 25 parts; clay, 50 parts; oxide of thorium, 25 parts. (4) Kaolin, 30 parts; clay, 20 parts; oxide of thorium, 50 parts. (5) Kaolin, 25 parts; clay, 25 parts; oxide of thorium, 50 parts. The enamel paste mentioned in Nos. 1 and 2 composition is preferably of the kind which consists "of tin and lead calcined and combined with silicious sand and carbonate of lime, and mixed into a paste with water."

The kaolin is first cleared of all impurities, and reduced to impalpable powder. It is then combined with the other ingredients named; and to these materials (which must be thoroughly mixed together in a dry state) is added a sufficient quantity of water to produce a liquid of creamy consistency. To the solution is then added a quantity equal to 8 per cent. of powdered gum arabic. The mixture is then further stirred until the gum is entirely dissolved, which generally occupies about six hours.

The core or base of the solid mantle, which is a fabric of the ordinary character, is made to the form required to produce the shape desired to be given to the finished object. For example, the shape may be that shown in the engraving, in which the mantle is of tulip shape, and provided with a nib or stud to be received into a holder carried by the burner.



This fabric base is then steeped or repeatedly dipped in the creamy solution for several minutes—until it has absorbed a sufficient quantity. It is then allowed to dry at a temperature not exceeding 20° to 25° C.; care being taken to observe the conditions usual in the manufacture of porcelain ware.

Immediately the articles have sufficiently set to enable them to be transported, they are placed in a saggar, and conveyed to a muffle or oven, to be baked or hard fired; and subsequently they are gradually cooled in the manner employed in the production of porcelain goods.

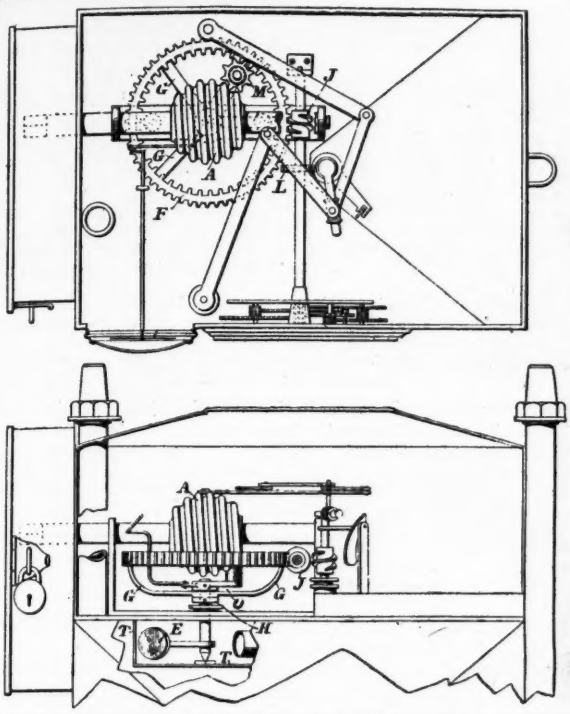
Explosive Engines and Motors.—L'Homme, E. O., of Rouen, France. No. 29,854; Dec. 28, 1896. Date claimed under International Convention, May 29, 1896.

Explaining the *rationale* of his invention, the patentee points out that gas-motors heretofore used, operating either on the four-stroke or the two-stroke cycle, present "the inconvenience of mixing the fresh gases with a certain quantity of the burnt gases from the preceding explosion." From this results "loss of energy, sometimes no explosion takes place—hence an irregular motion, and an abnormal expenditure of gaseous products; moreover the exhaust-valves, operating in the midst of gas at a very high temperature, easily become deteriorated, and their movement becomes irregular." In his motor, this cause of bad working is obviated by dispensing with the exhaust valve or valves, and consequently all the parts which depend thereon; and the two-stroke cycle is realized with a single cylinder, wherein a piston moves which has one face turned to the

open air, whereas "up to the present time the two-stroke motion with a single cylinder was obtained only by utilizing the two faces of the piston."

Coin-Freed Gas-Meters.—Glover, R. T. & J. G., of Clerkenwell. No. 520; Jan. 7, 1897.

This invention relates to valve operating appliances for use in conjunction with coin-actuated gas-meters.



As shown in the engraving, the patentees propose to employ a spheroidal screw A (preferably horizontally) mounted upon, or forming part of, a rod or shaft carried in bearings, which may upstand from a casing, part of which contains the valve E, by which the flow or stoppage of the gas is effected. An internally and externally toothed (planetary) ring F, of given diameter, having dished arms G and pivotal collar H, surrounds the screw A under the horizontal shaft, and is so mounted that it is revolvable by the engagement with the external teeth of the ring F with the worm J under the action of the meter mechanism, by which the worm is operated through the pinion L. A toothed pinion M is arranged between the screw A and the ring F, and is in gear with the screw and with the internal teeth of the ring F. The pinion is pivoted to, and freely revolvable upon, a curved arm Q, the boss of which is connected to a spindle passing through the collar H and a stuffing-box and gland to the interior of the valve-box T. The spindle at its lower end carries the valve E, for closing the inlet to or outlet from the box T to the meter bellows or consumer's pipes. A pointer is connected by rods with the pivot carrying the pinion M; and when in action, it moves over the indices of a dial a distance actually corresponding with the movement of the pinion M and valve E—this movement being visible through an opening in the meter-case.

In action, the turning of the screw A from outside the meter after the insertion of a coin—as described (say) in patent No. 22,830 of 1894—rotates the engaging pinion M, thereby causing it to "walk" circumferentially over the internal teeth of the ring or wheel F, and impart movement to the curved arm Q and valve-arm attached to the lower end of the spindle, and thus allow the gas to flow. The worm J operated by the meter mechanism revolves the ring F by its engagement with the external teeth of the ring F, and causes the pinion M to rotate and walk back over the screw A, and close the valve E.

Pilot-Lights for Incandescent Burners.—Guyan, A. J., of Bristol. No. 1633; Jan. 21, 1897.

In the construction of gas lighting appliances for burners with pilot-lights, the patentee proposes to convey the pipe which supplies gas for the pilot-light within the bracket, pendant, or the like which conveys the gas to the main burner, and then carry the pipes to a tap or taps placed at any distance from the burner or series of burners, whereby the pilot and main lights may be alternated as required.

Acetylene-Gas Burners.—Jarre, V., and Usannez, E. J., of Paris. No. 4370; Feb. 18, 1897.

This invention relates to burners and gas-taps therefor, more especially intended for use in burning acetylene gas. The principal object aimed at is to provide a burner suitable for rich gas; as, although the orifices through which the gas issues are very small, they can be easily cleaned by removing a socket or cap arranged over the body of the burner, and secured by a screw-nut to the central part. The two pieces together constitute the burner proper. The central part is hollow, and communicates with the gas-pipe; and it has near its end a recess forming an annular conduit, when the cap is in place. An orifice conducts the gas from the interior of the central part into the annular recess. The central part is also provided with recesses extending from the annular recess to the top for the passage of the gas to the point of ignition. The tap (so as to prevent leakage of gas) is composed of a conical plug turning in a lining of cork or like material provided in the body of the tap. A screw socket, by pressing on rings slipped on to the stem of the valve, ensures gas-tight closure between the plug and the lining.

Producing Acetylene.—Sefton-Jones, H.; a communication from P. P. H. Macé, of Paris. No. 14,905; June 19, 1897.

This invention has for its object to provide a method of manufacturing acetylene which "will obviate the deposit of carbon which is rapidly produced upon the burners, and which prevents the free escape of the gas." In burning it inevitably polymerizes; and the carbon resulting from the polymerization, is deposited at the orifices of the burners and soon chokes them.

The patentee proposes to add from 5 to 15 per cent., according to requirements, of protoxide or binoxide of manganese to the usual charge of the carbide furnace, consisting practically of lime and carbon. The charge thus modified is composed, on its withdrawal from the furnace, of a mixture of carbide of manganese and of carbide of calcium. As the carbide of manganese contains only 7 per cent. of carbon, the addition of 5 to 15 per cent. of oxide of manganese does not absorb in its transformation into carbide of manganese a sufficiently large quantity of carbon to modify the cost of the mixture, compared with the cost of carbide of calcium alone. The price of the mixture of carbides of manganese and of calcium thus obtained is therefore practically the same as that of carbide of calcium. When, however, the mixture of carbide of calcium and carbide of manganese is made use of to produce acetylene, the action of the carbide of manganese upon the water determines the production of methane, and of an equal quantity of hydrogen which is in the nascent state, and acts upon the carbon which tends to be deposited at the moment of the combustion of the acetylene, and forms with it a combustible hydrocarbon—thus obviating any carbonaceous deposit.

The chemical reaction is as follows:—

$$Ca\,C_2 + 3\,Mn\,C + 8\,H_2\,O \begin{cases} 2\,(C_2H_2) + CH_4 + \\ Ca\,O\,H_2\,O + 3\,Mn\,O\,(H_2\,O) \end{cases}$$

of which the upper represents the gaseous, and the lower line the residual products.

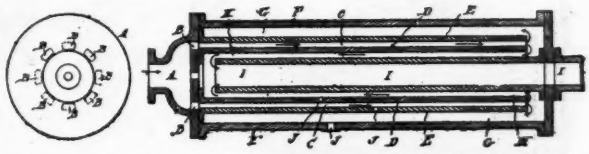
As the combined action of the mixture of the carbides of manganese and calcium is the consequence and the result of the addition of oxides of manganese to the charge of the carbide furnace, and as this addition does not practically modify anyway either the cost price or the facility of obtaining acetylene, it follows (says the patentee) that this addition "constitutes a very important improvement in the obtaining of acetylene gas," because it prevents any carbonaceous deposit at the burners at the moment of the combustion of the acetylene gas. It is obvious, moreover, that, "by reason of the small proportion of carbide of manganese employed, the quantity of methane produced is too small to alter the illuminating qualities of the acetylene, and it cannot exercise any other action except that of perceptibly increasing the heating power of the flame."

Porous Carbide Containers for Acetylene Apparatus.—Edwardes, E. J., of South Hampstead. No. 16,738; July 15, 1897.

The essence of this invention is that water transudes to the carbide through any suitable material of a porous nature, "so that the gas is gently and continuously disengaged." The water may be allowed to pass through the walls of a cell wholly or partly porous, whether it pass from without inwards, or from within outwards, or across a porous diaphragm or partition; and the cells may be variously combined in use.

Silencing the Exhaust from Gas-Engines.—Cribbes, G., and Ross, A. F., of Edinburgh. No. 23,541; Oct. 13, 1897.

This is an apparatus by which the exhaust gases from gas-engines are expanded and cushioned, and allowed to escape quietly into the atmosphere, without the noise so common with existing engines.



To the exhaust-pipe of the engine is connected a chamber A, into which the exhaust enters, where it breaks up and escapes through the ports B and expands in the passage C, which is formed by the external side of the pipe D and the internal side of the pipe E. The external side of the pipe E and the inside main-case F, form a cushioning chamber G. The exhaust gases, having thus been expended and cushioned, escape quietly along the passage H, and into the pipe I, which leads to the atmosphere. J are openings for the relief or discharge of water, &c., that may accumulate.

Incandescent Mantles.—Janz, J., of Berlin. No. 26,311; Nov. 11, 1897.

The intention of the inventor is to remove certain of the objections in operation of incandescent mantles as at present constructed. He proposes a method of manufacturing durable head-pieces in incandescence mantles in such a manner that the head portions are woven, directly on the machine, by using either (1) a closer formation of meshes, (2) a stronger or a doubled thread, or (3) a stronger formation of meshes, and simultaneously a thicker or a doubled thread. At the same time, there is a gradual transition from the even part to the strengthened head portion, which is obtained by inserting an intermediate piece of somewhat greater firmness, greater thickness of thread, or somewhat greater firmness and greater thickness of thread, than the even part.

Protecting Incandescent Gas Mantles.—Chalmers, G. W., of Footscray, Victoria, Australia. No. 26,633; Nov. 15, 1897.

The patentee calls his apparatus a "shock receiver," as it "cushions and absorbs any sudden concussions, and prevents same being communicated to the fragile mantle."

Upon the usual bunsen burner a spiral spring is placed, so as to

encircle and closely fit upon it, and having at its bottom a portion turned into volute form. The spiral spring is arranged preferably with convolutions near the base close together, and somewhat spread out towards the top. It is arranged to support a weighted body or inert mass C, of metal or other material, and preferably about 1½ lbs. in weight. The weight is recessed for the reception of the spring, and has near its bottom an enlarged recess in which the extending or volute base lies, so as to press lightly upon the sides of the recessed part, and assist in keeping the weighted mass plumb, at the same time allowing of slight sway in any direction. The weight is open at top, and is provided with a tube communicating with the opening, for the purpose of

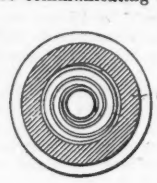
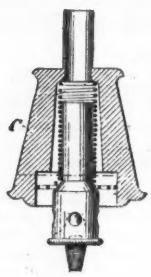


Fig. 2.

Fig. 1.



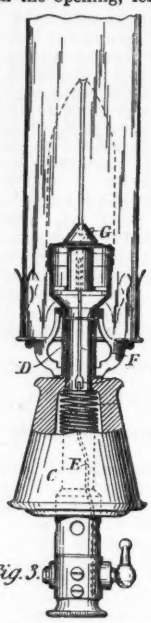


Fig. 3.

receiving the ordinary crown D carrying the burner, mantle, &c. E represents the ordinary pilot-tube which, with the burner, is connected with the gas-supply service. The tube passes up within the bunsen and spiral spring, and projects for a short distance above it. There is a similar tube F, which terminates in an enlarged mouth; and in this mouth the pilot-tube terminates without being in contact with it. The tube is supported preferably by a cross-bar attached to it, and resting upon the top of the bunsen. It projects into the burner and either is in communication with a small jet G, or else it may be fixed rigidly to the top portion of the burner.

APPLICATIONS FOR LETTERS PATENT.

28.—M'Conechy, J., "Burners applicable to acetylene and rich oil gas lighting." Jan. 1.

32.—Leede, J., "Producing calcium carbide." Jan. 1.

38.—Wigham, J. R., "Illuminating buoys and beacons." Jan. 1.

49.—Puchmüller, B., "Fluid, and process of manufacturing same, for incandescent lighting purposes." Jan. 1.

57.—Forbes, Sir C. S., "Acetylene lamps." Jan. 1.

74.—Crocker, S. H., "Gas-burners." Jan. 1.

99.—Legge, J. St. Clair, and Cooper, A. S., "Purifying, cooling, drying, and arresting the carbon in acetylene gas." Jan. 3.

155.—Alsina, F., "Explosion engines." Jan. 3.

178.—Bennett, J. F., and Moorwood, T. P. & H. S., "Gas-producers for gas and oil engines." Jan. 4.

190.—Johnson, W. B., "Fluid-meters." A communication from the Pittsburg Supply Company, Limited. Jan. 4.

256.—Lorrain, J. G., "Explosion engines." A communication from F. Alsina. Jan. 4.

309.—Melhuish, J. B., Guthrie, M., and Hughes, J. H., "Acetylene-gas lamps." Jan. 5.

315.—Germains, A. Z., "Means for lighting, heating, and smoke consuming." Jan. 5.

342.—Clark, A. J., "Gas-pendants." Jan. 5.

349.—Lorrain, J. G., "Explosion engines." A communication from F. Alsina. Jan. 5.

378.—Helme, B., "Gas-engines." Jan. 6.

391.—Bower, A. S., "Manufacturing water gas, and carburetting or enriching the same for illuminating purposes." Jan. 6.

404.—Levy, B. W. (of the firm of David Cohen and Co.), Hooker, W., and Morrell, R., "Incandescing media for lighting purposes." Jan. 6.

408.—Abel, C. D., "Treating the distillation products from carbonaceous materials and the like." A communication from E. Theisen. Jan. 6.

453.—Hillier, W. H., "Generating and storing acetylene gas." Jan. 7.

457.—Barnard, E., "Generating and using acetylene or other gas." Jan. 7.

459.—M'Cormick, J. F., "Purifying and increasing the illuminating power of gas." Jan. 7.

472.—Haviland, F. H, and Farmer, J., "Manufacture of calcium carbide." Jan. 7.

476.—Oehlmann, E. H. C., "Igniting and extinguishing gas-flames from a distance." Jan. 7.

521.—Furneaux, J. B., and Butler, E., "Explosion engines." Jan. 7.

528.—Williamson, A., "Acetylene gas generators." Jan. 8.

543.—Wood, R., "Gas-burner improvements." Jan. 8.

553.—Moreton, H., "Acetylene-gas lamps." Jan. 8.

558.—Herring, W. R., "Construction and ventilation of gas-lamp lanterns." Jan. 8.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

The Use of Breeze as Boiler Fuel.

Sir,—The article on the above subject in your last issue cannot fail to be of great interest both from a commercial and an engineering point of view. If the economies shown to have resulted at the Nuremberg Gas-Works may safely be taken as a basis, the use of breeze in place of coal will be productive of considerable economy to users of steam power.

There is, however, one point in connection with the matter on which further information is desirable. I allude to the possible effect upon the boiler itself. In recently discussing the question of the comparative effects of the use of coal or coke in boilers, so far as any deterioration of the plates of which they are made is concerned, opinions varied very much among the experts present; the majority inclining to the idea of such deterioration being old fashioned—indeed, "exploded." This may or may not be correct as applied to wrought-iron plates; but now that the majority of modern boilers are made of steel, it would be exceedingly interesting, and indeed valuable, information if the results from actual experience could be furnished for the benefit of those interested in the subject.

My object in writing is to ask any of your readers who can throw light on the matter to give us, through your columns, the benefit of the knowledge they have acquired respecting it.

London, Jan. 14, 1898. C. E.

Gaseous Firing.—In answer to Mr. Percy H. Fletcher's inquiry in the last number of the "Journal," "Country Manager" writes that the two bottom retorts in each setting are ⌂ shaped, and the other four oval, 21 in. by 15 in., and 9 ft. 3 in. long, inside measurement. The weight of the charge in the former is 294 lbs.; and in the latter, 336 lbs.—in each case a six-hour charge. The seal in the hydraulic main is 1 inch.

LEGAL INTELLIGENCE.

Sunlight Incandescent Gas Company, Limited, v. Incandescent Gas-Light Company, Limited.

In the Court of Appeal last Tuesday, Mr. Jenkins, Q.C., stated that the appeal in the above-named action, which was tried by Mr. Justice Wills, last July (see "Journal" for July 27, p. 221), had been withdrawn, on terms agreed upon between the parties. It will be remembered that the action was brought against the defendants for an infringement of the Rawson patent for stiffening the mantles of incandescent gas-burners; but the allegation was not sustained. The validity of the patent was, however, upheld; and consequently the plaintiffs were victorious on this issue.

Manchester Corporation Tar Contracts.

In the Chancery Court of Lancashire last Tuesday, before Vice-Chancellor Hall, Mr. Maberly appeared in support of an application to amend a statement of claim in the action of *Hardman v. Lockwood*. Messrs. Hardman and Holden, Limited, carry on the business of distillers and manufacturers of the products of gas tar at Miles Platting; and Messrs. Hamor Lockwood and Co., the defendants, are also distillers of gas tar at the same place. The original claim of the plaintiffs was "for specific performance of a contract made on July 10, 1895, between the defendants and the plaintiffs for the sale by the defendants of 13,500 tons of tar to be the produce of the Bradford Road Gas-Works of the Manchester Corporation, at the price of 24s. per ton, to be delivered in three years in monthly instalments, as specified therein, and for damages, and for an injunction to restrain the defendants, their servants, or agents from using, selling, or otherwise dealing with the said 13,500 tons of tar or any portion thereof." There was afterwards an amended statement of claim; and the present application was for leave to re-amend the statement of claim whereby the matter resolves itself into an action simply for breach of contract. Mr. Grant (on behalf of Messrs. Lockwood and Co.) said the amount originally claimed was £7500; and it was now reduced to £2000. The Vice-Chancellor observed that it was now proposed to turn the action into one of common law. Mr. Grant said he was willing on behalf of Messrs. Lockwood and Co. that the action should be transferred if His Honour made an order upon the plaintiffs to pay the costs occasioned by the proceedings in the Chancery Court. The Vice-Chancellor made an order giving leave to amend, and transferred the action to the Queen's Bench Division; the costs incurred up to the present time to be paid by the plaintiffs in any event.

Cutting Off the Supply of Gas to a Bankrupt's Premises in the Possession of an Official Assignee.

In the "Journal" for May 25 last (p. 1197), we reported some proceedings in the Northern Division Police Court, Dublin, as the result of which an Official Assignee obtained judgment against the Alliance Gas Company for cutting off a supply of gas. The Magistrate before whom the matter came (Mr. Keys) stated a case; and the question in dispute was argued in the Queen's Bench Division of the High Court of Justice of Ireland last Thursday, before the Lord Chief Justice (the Right Hon. Sir P. O'Brien) and Mr. Justice Gibson. The point involved was as to the right of a Mr. M'Entire, who, as Official Assignee, was in occupation of premises at Bachelor's Walk, Dublin, in which Charles Percy Brett, an absconding bankrupt, had carried on the business of a wine merchant, to insist on a supply of gas being furnished by the Company. Brett was adjudged bankrupt on Feb. 26, 1897, and the Official Assignee, under sanction of the Court of Bankruptcy, has been carrying on the trading. On the 13th of March, the Company's Inspector called at the premises

and was then informed by the Court messenger in charge that Brett had absconded, and that the Official Assignee was conducting the business and would pay for any gas consumed from the date of the bankruptcy. The Company declined to give the Official Assignee, as an individual separate and distinct from the bankrupt, a supply of gas, and required payment of £5 15s. 9d., arrears due by Brett, failing which they would cut off the supply. The Official Assignee declined to discharge these arrears, but wrote undertaking to pay for all gas used from the date of the bankruptcy. On the 8th of April the Company disconnected the supply; and the Magistrate held that this was, under the circumstances, a wrongful act. He inflicted a statutory fine of £1 a day, amounting to £17; but the Company questioned his decision on a point of law. In the result, the Court upheld the ruling of the Magistrate, and directed the Company to pay the costs.

Liability for Water Supplied to Under-Tenants.

At the Marylebone Police Court last Thursday, application was made to Mr. Curtis Bennett for a process against the West Middlesex Water Company for refusing to supply certain premises with water. The applicant was the rated occupier of the premises, for which he paid a yearly rental of £89, and which he sub-let to three tenants, who had each agreed to pay their water-rate to the Company. They had fallen into arrear; and as the applicant refused to pay, the Company cut off the supply in December. The Magistrate said he was not sure that they were not right. Applicant said he gave the Company notice that the tenants were responsible for the water-rate. The Magistrate said that might be so; but they could recover against the rated occupier. Applicant: But the Company have acknowledged the liability of the tenants by applying to them for payment. The Magistrate: Yes, to save you. You can recover against the tenants in the County Court. As a matter of fact, you make a good thing out of the premises by sub-letting; and you want to get your profit and leave the Water Company in the lurch. You want the Company to supply your tenants with water, which they refuse to pay for, in order that you may get all the benefit. No, no; I cannot aid you in doing that.

More Consolidation of American Gas Companies.—As the result of negotiations which have extended over more than a year, the five Gas Companies in Pittsburgh and Allegheny have consolidated, and will be operated under one head, with a capital stock of $5,000,000. The plants amalgamated are those of the Pittsburgh Consolidated, Allegheny, South Side, and East End Gas Companies. New plant to the value of $800,000 is to be erected, supplied with improved machinery, which it is believed will effect a saving of about 80 per cent. in the cost of production. An important feature of the new arrangements will be a large installation of inclined retorts.

Additional Capital Powers for the Wrexham Water Company.—An extraordinary general meeting of this Company was held last Tuesday, for the purpose of considering a proposal to apply to the Board of Trade for a Provisional Order to raise additional capital not exceeding £40,000, by the issue of new ordinary shares or new preference shares, or stock, and to borrow in respect of the additional capital one-fourth of the amount thereof. In moving a resolution sanctioning the application, the Chairman mentioned that they had exhausted their capital; and owing to the growing requirements of Wrexham and district, it became imperative to raise fresh capital. The proposed method of raising the money was stated to be the best in the interests of the Company. The resolution was unanimously carried.

Steam-Rollers and Damage to Gas-Pipes.—On the evening of Saturday, the 8th inst., while some employees of the Ballynahinch Gas Company, with the Manager (Mr. J. Watson), were engaged in searching for an escape in Railway Street, a serious explosion took place. For the previous three days a steam-roller had been working in the street, and it is believed that the pressure on the road had displaced and broken some gas-pipes. The escape had been traced to the house of Mr. Norwood, a hairdresser; and, as it was thought to be of a trivial character, an attempt was made to locate it by applying a match. An explosion followed, tearing up the footway and completely shattering the floors, ceiling, and windows of Norwood's house. Mr. Watson sustained a severe shock, his leg and head receiving injuries; but no one was seriously hurt.

The Typhoid Epidemic at Maidstone.—The Local Government Board have fixed the 31st inst. as the date for opening the inquiry into the cause of the typhoid epidemic at Maidstone. Mr. Davy is named as the Inspector who will conduct the investigation; and he will be assisted by Dr. Theodore Thomson and Mr. G. W. Willcocks—the former being one of the Medical, and the latter one of the Engineering Inspectors of the Board. It is stated that a number of the leading householders who have had typhoid in their houses contemplate combining for the purpose of proceeding against the Water Company for the recovery of damages. It is understood that, as a first step, they will tender payment for the water supplied to them for the last two quarters of 1897; the object being legally to complete the contract under which they are served. So far no bills have been delivered in the districts supplied from the Farleigh sources, though the water-rents have been collected elsewhere. The next step will be to deliver claims upon the Company for expenses attendant upon the illness attributed to the polluted water. In many cases these will exceed £200 in amount. Afterwards, if necessary, a test case will be brought against the Company. At the meeting of the District Council last Wednesday, the Mayor (Mr. J. Barker) read a letter from Messrs. Sharpe, Parker, and Co., the Solicitors called in to advise the Council, urging that they should apply to the Local Government Board to postpone the inquiry until Dr. Thomson, the Inspector originally sent down to privately investigate the outbreak, had presented his report. The Water Committee recommended that this advice be acted upon, and that the Board be requested to postpone the inquiry to a date not later than March 1. The Mayor, in moving the adoption of the report, expressed the opinion that the inquiry would do the town more harm than good. It would be best to let the whole thing sink into oblivion. Mr. Baker said the feeling in the town was strongly in favour of the inquiry taking place. The motion was adopted by a large majority.

MISCELLANEOUS NEWS.

THE MARKET FOR SULPHATE OF AMMONIA DURING THE PAST YEAR.

The "Annual Review of the Market for Sulphate of Ammonia" which Messrs. Bradbury and Hirsch, of Liverpool, send out early each year, is a publication to which many readers of the "JOURNAL" are accustomed to look for authoritative information in regard to the progress of a commodity in which they are specially interested. The "Review" for the past year was sent out towards the close of last week; and we are able to-day, by the courtesy of the authors, to give the following extracts from it.

In introducing their "Review" for 1896, Messrs. Bradbury and Hirsch, while expressing sympathy with producers in the trying experiences through which they had been passing, ventured the opinion that the horizon was clearing, and that the 1897 season might go far in the direction of placing sulphate of ammonia in its right position in the manure trade. While doubting whether the last instalment had been paid by producers in respect of past mistaken policy in stocking, they thought that, with prospects of a further increase in consumption and with the speculative element largely on the "bull" side, as it then was, some advance in prices might reasonably be expected if stocks were judiciously handled; though they deprecated any forcing of prices as likely to lead to reaction. The policy indicated by their remarks would no doubt have admitted of a higher range of values over the nine months from January to September than those actually realized, and probably of a higher average for the year; but the authors readily admit that it would not have righted sulphate of ammonia as effectively as the policy actually pursued. They therefore heartily congratulate makers that their product is to-day in a sounder position, and that its prospects are brighter than has been the case at any time within the past three years.

Before entering upon a review of the sulphate trade, Messrs. Bradbury and Hirsch, following their customary practice, glance at the allied trades and the agricultural situation, in order to see in what direction they point. Twelve months ago, they were constrained to take a somewhat pessimistic view of the agricultural outlook, both in the United Kingdom and on the Continent. Within the past six months, however, the position has improved, though the adverse elements to which they referred are still forces to be reckoned with. On the whole, the agricultural situation shows distinct improvement; and the greater facility with which money is found to be forthcoming, proves the greater buying power of the farming community. The year's retrospect of the general manure trade discloses very little upon which it is possible for the authors to dwell with satisfaction. The complaint is still that consumers, home and foreign alike, are more and more availing themselves of superphosphates and sulphate of ammonia or nitrate of soda, instead of high-class compounds, and that the use of basic slag is an ever-increasing quantity. This is, however, a feature in the trade with which sulphate of ammonia producers will not concern themselves very much, as they will consider that it cannot matter to them whether their product is taken for direct use or for mixing purposes, so long as it is taken.

With regard to nitrate of soda, we learn that the past year opened with a visible supply somewhat larger than that at the beginning of 1896; but it was calculated by the trade that, with an increase in consumption similar to that during the spring of 1896, the available supply would be barely sufficient to meet the demand, and that sellers would thus become masters of the situation. The history of the 1897 spring season shows that it proved to be more than sufficient. The season was a late one, unlike that of 1896. There was no great increase in the consumption of nitrogenous material (nitrate of soda included). Then, consumers did, as a matter of fact, largely avail themselves of cheaper sulphate of ammonia in place of nitrate of soda; and, instead of a considerable increase in the consumption of the latter article from January to April, as was reckoned upon, there was an actual decrease. The nitrate of soda interest, being heavily committed to a high range of values, managed to advance spot prices somewhat in January, and to maintain them fairly well until April; but a heavy spring demand not having fully set in until late in March, the case then became hopeless, and prices gradually drooped up to the end of June, when the value of ordinary nitrate was 7s. 4½d. per cwt., and that of fine quality 7s. 6d. per cwt. The intention of the Combination was to limit shipments to a quantity that would bring about a price of 6s. per quintal f.o.b.—equal to about 8s. 9d. per cwt. delivered at United Kingdom and Continental ports. The actual price in the spring, delivered free on board at the West Coast, was very little more than 5s. per quintal; while in the autumn, owing to advanced freights, it dwindled to about 4s. 9d. per quintal. The Committee were wofully out in their estimate of the quantity necessary to produce the price they aimed at; and in June it was recognized that the situation had become critical. Attempts were made, forthwith and again later, to bring producers into agreement to curtail the quantity arranged to be shipped from April, 1897, to March, 1898, but without success; and in October the Combination came to an end. The result has been to decidedly strengthen the statistical position. The business in the second half of the year wore a more healthy look; July to December deliveries having been 40,000 tons in excess of those for the corresponding period of 1896. The authors consider there is a prospect of still further improvement. Before leaving this subject, they press upon the attention of nitrate producers one thing. The past year has, they say, demonstrated beyond the possibility of question that no price at which nitrate of soda can be sold can ever enable it to drive sulphate of ammonia out of the field. Last year the driving was all the other way. They have again and again pointed out that the rate of production of sulphate is determined by altogether other considerations than its own market value. Whatever the market price may be, it must be produced and sold. It is otherwise in the case of nitrate. The rate of its output must be determined by its selling value; and production cannot go on much beyond the point when it ceases to be remunerative. These being the facts, Messrs. Bradbury and Hirsch consider it would be to the advantage of producers of both articles if nitrate producers would once for all recognize that any attempt to displace sulphate must be futile, and even

disastrous. The competition is altogether unequal, and whatever calculations nitrate producers may make as to the world's requirements of nitrogenous material, they should always first allow for the estimated world's production of sulphate of ammonia.

Coming to the principal subject of the "Review"—sulphate of ammonia—the authors feel that a position in every way satisfactory to producers can need no argument to justify it to them. They therefore content themselves with a shorter comment upon the year's proceedings and the present situation than they thought necessary when reviewing the course of the market in 1896. The primary determining factor all through the year was, they think, the selling policy of the large London makers, who, to begin with, held the bulk of the stock. On this point, they make the following remarks:—

The makers in question would seem to have made up their minds at the outset that so long as the millstone of unwieldy stocks hung around the neck of the market, so long the market must remain the plaything of speculators; and that until the quantity in the country was reduced to a bare working stock, there could be no hope of real and lasting improvement in prices. Having, in October and November, 1896, sold heavily, stock and production, for delivery up to April, and being therefore not much interested in spot prices meantime, they proceeded, early in 1897, to offer further ahead—May to August delivery—at a small premium on spot prices. This policy they consistently pursued right up to September, when, it may be said, the corner in the fortunes of sulphate of ammonia was effectually turned; the stock at the end of that month having been reduced to some 7000 or 8000 tons. A drastic measure like this of course involved a serious sacrifice in price (on stock and production) on the part of all holders of stock, and a smaller sacrifice (on current production only) on the part of all other producers; and we cannot withhold the expression of our admiration of the courage and persistency with which the operation was carried out. Within the nine months January to September, the stock in the country was reduced by something like 18,000 tons; and such a clearance could not fail to prejudicially affect the market. The wonder is rather that prices were so well maintained. Had so large a stock been forced upon the market with prices to start with £2 or £3 per ton above those current for nitrate of soda, unquestionably the effect would have been to depress values to something near the nitrate of soda level; but with prices per ton below the level of those current for nitrate of soda, the case was altogether different. The "logic of low prices" had brought about a substantial reduction in stocks in 1896; and it was again primarily the relative cheapness of sulphate of ammonia, occasioning a further large reversion from the use of nitrate of soda, which enabled the market to absorb in six months—January to June—fully 16,000 tons of stock, in addition to current production, without at any time allowing prices to be depressed more than 2s. 6d. per ton below the opening quotation in January.

In the second half of the year, when the question of the relative merits of sulphate of ammonia and nitrate of soda scarcely arises, a new and important factor made itself unmistakably felt. The rapid increase in production in Germany and France from 1894 to 1896 had much to do with upsetting the balance of supply and demand which it took nearly all 1896 and 1897 to readjust. There was not within the past year any great development in production in Germany; while in France the output was barely equal to that of 1896. Recourse was consequently had to the English market on a largely increased scale by both countries, especially from June, in order to fill the gap thus occasioned.

At the close of 1896, it was generally anticipated that an effort would be made to improve values. There was therefore, at the outset, very little disposition to offer for delivery ahead, especially in the face of a hardening spot market, unless at such a premium as practically precluded business; buyers being disinclined to operate at any substantial advance. Later in January, when London makers came out as sellers for May to August delivery at £8 per ton, Beckton terms, the attitude of speculators completely changed, and they began to offer ahead at and under spot prices. It was assumed, and, as subsequent events proved, with good reason, that the intention of these makers must be to make a clearance of stocks, and that prices would therefore be determined by a supply including stock and current production, and not by current production *plus* only a moderate portion of existing stocks, as had up to that time been anticipated. Messrs. Bradbury and Hirsch point out that there was, of course, an element of risk in acting upon this assumption, as it could not be certainly known how far the London makers intended to go, or at what moment their policy might be altered; while it was well known that the 1896 spring consumption had effected a large reduction in stocks, and that there was everything in prices at the opening of 1897 to induce a still larger consumption over the ensuing season. Hence there was necessity for caution, and for readiness always to "right about face." Speculative offering was therefore for some time only for delivery a month or two ahead; the operators all the while intently watching the movements of the London makers. Later, when first impressions seemed to be confirmed by consistent London forward offering, they became more venturesome; and in April they began to offer for July to September delivery on the basis of spot prices, and up to the end of June at an actual discount. In June, there were sales for delivery up to the end of the year without any premium; and business was done on these lines and at a slight advance until August, up to which month the "Bears" had, on the whole, the best of it, though there could not at any time have been a wide margin of profit—home demand having, while it lasted, seriously disturbed speculative calculations. In the summer months, advantage was taken by holders of stocks in the Provinces to clear out; the London makers continuing to offer ahead at a moderate premium. This served the immediate interests of the "Bears" in keeping prices down; but it probably led them into a more risky policy in forward selling than they might otherwise have pursued. Unlike 1896, exports in the second half of the year continued to increase; and in August it began to dawn upon speculators that they had overshot the mark—that supplies were becoming scarce. Whatever factors determined the reckless forward selling in the summer, the position of the sellers must have been an extremely disagreeable one; prices having advanced from August no less than 30s. per ton.

In their last "Review," Messrs. Bradbury and Hirsch discussed in detail the many proposals put forward with the object of righting the sulphate of ammonia trade; and the conclusion of their argument was that relative cheapness alone held out the promise of an early and effective restoration of the balance of supply and demand. They think they may fairly claim the action of the London makers as an endorsement of the opinion they expressed, and the result of that action as a proof that their argument was sound. They proceed to show where the extra demand has come from, and in what direction the best chances of producers lie. Taking, first of all, home consumption, they estimate the increase during the past year—practically all in the first six months—at 2000 tons. This does not, however, fully represent the augmentation in the actual consumption within the United Kingdom. The quantity taken by home manure manufacturers has always been considered as home consumption, though a considerable portion of it has subsequently been exported in the shape of compounds; and it is impossible to determine approximately the quantity so exported. The larger consumption of sulphate during the past two years has mainly been by those who had not previously used it. It has taken a long time to make British farmers see the advantage of using sulphate; and relative cheapness has been the irresistible argument. It is true that there is not now the same inducement in price; but sulphate is still cheaper, per unit, than nitrate, and consequently there is nothing in relative prices so far to cause a reversion to the use of the latter article. Moreover, as the authors point out, the agricultural mind is intensely conservative; and just as it was slow to take up with sulphate, so it will be slow to abandon it in the absence of a substantial inducement in the way of price. They commend the efforts now being made by the Sulphate of Ammonia Committee to influence the consumption of their product. Educating and advertising will tend to popularize sulphate of ammonia.

Looking to the destination of the exported sulphate, we find that the increase in the quantity sent to France last year was larger than that to any other country; being no less than 10,400 tons as compared with 1896—5500 tons in the first half, and 4900 tons in the second. Taking Germany and Belgium together (the bulk of the shipments to the latter country eventually finding their way into Germany) the total increase was 11,800 tons—7000 tons from January to June, and 4800 tons from July to December. France and Germany are beyond all other countries nitrate of soda ground—their consumption being nearly two-thirds of the whole taken by Europe; and it is there, as Messrs. Bradbury and Hirsch anticipated, that the consumption of sulphate has made most progress. The next largest increase was to Spain—6200 tons. The demand from the United States was disappointing—the shipments from the United Kingdom showing a decrease of about 1000 tons last year as compared with 1896; and there was a falling off in the exports to sugar-growing colonies.

Messrs. Bradbury and Hirsch estimate the total production of sulphate of ammonia from all sources in the United Kingdom during the past year at 202,000 tons, apportioned as follows:—

	Tons.
Gas-works	136,000
Iron ,,	18,500
Shale ,,	37,000
Coke and carbonizing works	10,500

Of the total production, they reckon that England contributed 130,300 tons; Scotland, 69,000 tons; and Ireland, 2700 tons. The production during the previous five years was as follows:—

	1896.	1895.	1894.	1893.	1892.
Gas-works	127,500	119,600	113,500	112,000	110,750
Iron ,,	16,500	14,600	10,000	8,800	11,000
Shale ,,	38,000	38,300	33,000	28,500	23,100
Coke ,,	9,000	7,000	3,500	3,200	5,000
Totals	191,000	179,500	160,000	152,500	149,850

The production of sulphate in 1896 and the stock in makers' hands proved to be rather more than the estimate made by Messrs. Bradbury and Hirsch. They consider the continued increase in the consumption of coal gas remarkable, having regard to the extended use of the electric light, water gas, and other illuminants; and it appears to them to afford striking evidence of the prosperity of the manufacturing and other industries of the country. There was an increase last year in the production of sulphate from gas-works, blast-furnaces, and coke and carbonizing works; but from shale-works there was a smaller output. Continental production continues to augment; but not at the rapid rate witnessed in 1894, 1895, and 1896. In France there has been an actual decrease. The year 1897 opened with a stock of about 25,000 tons; and there was an increase in production of 11,000 tons as compared with 1896. The total exports in 1897 were 153,000 tons, against 127,000 in 1896—an increase of 26,000 tons. Home consumption is estimated at about 70,000 tons, or 2000 tons in excess of that in 1896. The stock at the close of the year was about 4000 tons—a bare working stock, and practically an irreducible minimum.

Messrs. Bradbury and Hirsch consider that a position like this speaks sufficiently eloquently for itself. They, however, briefly recapitulate the causes likely to affect the market in the near future. The agricultural outlook is decidedly brighter than it was a year ago. The larger direct use and wider experience of sulphate of ammonia will at least predispose farmers to avail themselves of it again. Current production only will be available; so that if there should be absolutely no increase in the consumption over the next six months, there would not be nearly enough sulphate of ammonia to meet the demand, assuming an increased production proportionate with that of 1896 and 1897. Speculators will, no doubt, show themselves from time to time; but it is thought they cannot now do much damage in the way of smashing prices. They are more likely to get hold of the bulk of production some way ahead, and then force prices unduly. This would cause premature reversion to nitrate, and a relapse in sulphate prices later. If prices continue to improve, reversion to nitrate must, of course, be looked for; but in the absence of any sensational advance, Messrs. Bradbury and Hirsch do not think it is likely to assume proportions calculated to disturb the balance of supply and demand for some time to come. They are of opinion that, at anything like present prices, makers will find a ready market for all their production, and especially when it is remembered that buyers abroad have to a material extent been postponing their purchasing for the chance of doing better in 1898.

The "Review" concludes with the usual record of the course of the market month by month; and this is followed by the customary tabulated statistics. The first table contains the comparative weekly prices of sulphate of ammonia and nitrate of soda last year. In the week ending Jan. 2, sulphate was 7s. 7½d., and nitrate 8s. per cwt.; on April 3, the prices were 7s. 9d. and 8s.; at Midsummer, they were level at 7s. 6d.; at

Michaelmas, they were 8s. 1½d. and 7s. 6d.; while at the close of the year they were 9s. 0¾d. and 7s. 7½d. respectively. The second table gives the average prices per ton of good grey (24 per cent.) sulphate, f.o.b. Hull—the figures ranging over 31 years—1867 to 1897. The following are the averages for the past ten years: 1888, £11 18s. 0½d.; 1889, £12 1s. 4½d.; 1890, £11 9s.; 1891, £10 15s. 5d.; 1892, £10 1s. 10½d.; 1893, £12 11s. 4½d.; 1894, £13 3s. 8½d.; 1895, £9 15s. 4½d.; 1896, £7 18s. 0½d.; and 1897, £7 18s. 4¾d. The third table shows the average prices per hundredweight of 95 per cent. nitrate of soda, in Liverpool, for the past ten years. They are as follows: 1888, 9s. 9½d.; 1889, 9s. 2½d.; 1890, 8s. 2d.; 1891, 8s. 9¼d.; 1892, 8s. 9½d.; 1893, 9s. 5½d.; 1894, 9s. 4½d.; 1895, 8s. 2¾d.; 1896, 7s. 11½d.; and 1897, 7s. 9½d.

MOSSLEY CORPORATION GAS SUPPLY.

Projected Improvements at the Gas-Works—Local Government Board Inquiry.

An inquiry on behalf of the Local Government Board was recently conducted by Lieut.-Colonel Smith, R.E., in regard to an application made by the Mossley Corporation for authority to borrow £11,000 for the improvement and extension of the gas-works.

The Town Clerk (Mr. J. Hyde) appeared in support of the application, and stated that it had been made under the Stalybridge and Mossley Gas Act of 1885. Prior to that year, the works both at Stalybridge and at Mossley were owned by a Company; but in 1884, the two Corporations agreed to buy the concern for £210,000. The partnership was afterwards severed; Mossley taking the works in their own town, and Stalybridge theirs. The actual position of Mossley's capital expenditure was £91,800 when they came into possession of the works; and they had exceeded their borrowing powers by about £1800. They were not one penny in arrear with their sinking fund; and naturally the Corporation took great credit to themselves for the fact. Mr. T. Newbigging, of Manchester, had been consulted by the Gas Committee, and they had resolved to replace the present small mains with larger ones. These mains were all taken from the original Company. The Corporation asked for as much time as possible to repay the loan.

Mr. *J. Mitchell*, the Chairman of the Gas Committee, gave evidence in support of the application. He said that Mossley and Saddleworth were manufacturing districts, and on this account they required a very good supply of gas of high illuminating power. In their own interests, they wished that the commodity they supplied might be a marketable one, and one customers would take to. They had 36 miles of mains. The district was very hilly; and this caused a large amount of leakage from the small pipes put down by the Company. Already they had had £90,000; and now they were asking for £11,000, in order that they might carry out alterations and improvements which were absolutely necessary in order to accomplish the object they had in view. He thought they never had a more unanimous and united Committee than the present one. Regarding the augmentation in the quantity of gas supplied, he might say that in 1887 they sent out 71 million cubic feet; in the past financial year it was 94 millions; and the increase which had taken place in the year just expired, as compared with the previous year, was something like 3 millions. It was thought that the storage should be increased, as the Committee and the Manager had not been very comfortable at times with regard to their short stock, as they had only a supply for two days and nights. There was the question of leakage. To their mind this was very high—14 per cent. The primary cause was that the mains were the same as the Company possessed. Not only did they leak, but they corroded; and this necessitated a higher pressure than would otherwise be required. There was nothing to hide in connection with the application; and if the Local Government Board, in their judgment, decided to let the Corporation procure the money, they would undertake to see that it was well and economically spent.

Mr. *H. Jones* endorsed all the Chairman of the Gas Committee had said. He remarked that there was perfect unanimity on the question, and he drew the attention of the Inspector to the fact that there was not a single inhabitant—other than Corporation members and officials—present at the inquiry.

The proceedings then terminated.

ELECTRIC LIGHTING NOTES.

At the meeting of the Wimbledon Urban District Council on the 5th inst., it was announced that the Local Government Board sanctioned the borrowing of £32,000 for electric lighting purposes.

The Wolverhampton Corporation have resolved to refuse their consent to the application of the Midland Electric Corporation for Power Distribution, Limited, to the Board of Trade for authority to supply electricity within the borough.

The Boston (Lincs.) Town Council on Monday last week passed a resolution in favour of lighting the town by electricity. The cost was estimated at £20,000; and it was contended that, including a sinking fund, the system could be adopted for £800 a year, against £956 now paid for gas.

Nearly six hours were spent last Wednesday by Mr. G. W. Wilcocks, of the Local Government Board, in hearing evidence at Bexhill relative to an application by the District Council for a loan of £20,000 for putting down an electric light installation in the town. Mr. Preece, jun., was the principal witness in support of the scheme. The opposition was a strong one; the principal argument used against the project being that it was premature—the town not being sufficiently large to support such an undertaking at the present time.

Last Wednesday, the Sheffield City Council unanimously resolved to adopt the terms of the bargain which the Parliamentary Committee suggested should be offered to the Electric Light Company, for the purchase of their undertaking. The minutes of the Committee were presented by Mr. Chambers, who first traced the course of the negotiations with the Company, and then dealt with the point which has given rise to so much difficulty. Originally, it was not thought that the stock given by the Corporation in purchase of the undertaking must be irredeemable; but Mr. Justice North's decision established that the Corporation could not compel the Company to accept redeemable stock. The judgment also debarred the Council from issuing the very irredeemable stock they were in need of. Apart, however, from the question of forced sale by the Company, there were the negotiations for a sale by agreement. The Corporation originally offered the Company £220 of their 2½ per cent. redeemable stock for every £100 expended on capital account up to May 31 last year. If the Corporation had won in the action, no doubt the Company would have been ready to sell at £200 instead of £220. But the higher figure, which the Committee were now again offering, was the price of their defeat at law; and if the Company accepted it, they would be, to a great extent, doing so as a favour to the Corporation. As a lever with which to put pressure on the Company to sell at the terms now offered, Mr. Chambers introduced his Committee's suggestion that the Council should authorize an application to the Local Government Board, for permission to issue irredeemable stock, and so overcome Mr. Justice North's adverse decision. Of course, if the Company accept the terms now offered by the Committee, there will be no need to go on with the application; but parliamentary sanction will in any case be necessary before any agreement can be carried out. The Tramways Committee's minutes were the next to come before the members; and the Lord Mayor (Alderman G. Franklin), who is Chairman of the Electric Light Company, invited Alderman Clegg to withdraw his recommendation that a power-generating station at Kelham Island for the electric tramways should be at once proceeded with. This he did on the ground that there was now every prospect of a satisfactory termination to the negotiations between the Electric Company and the Corporation, and that it would be more practical and economical to have, for both light-producing and power-producing purposes, a single establishment. Alderman Clegg acceded to the Lord Mayor's request.

METROPOLIS WATER SUPPLY.

The Quality of the Water During the Past Year.

The last report presented to the Official Water Examiner for the Metropolis (Major-General A. de Courcy Scott, R.E.) by Sir W. Crookes and Professor Dewar contains the following table showing the average monthly bacterial variations in the water supplied to London during the past year:—

Month.	Thames. Unfiltered.	Five Thames-derived Companies, Filtered.	New River. Unfiltered.	New River. Filtered.	River Lea. Unfiltered.	River Lea. Filtered.
Jan.	6,409	30	1,420	37	1,460	20
Feb.	9,580	22	1,589	20	1,177	40
March	9,187	33	1,160	30	1,080	22
April	3,277	38	892	13	708	27
May	2,937	40	388	44	791	279
June	73,893	74	2,005	69	66,822	69
Total.	105,253	237	7,454	213	72,038	457
Mean, Jan.-June	17,542	39	1,242	35	12,006	76
July	4,791	83	754	44	2,494	125
Aug.	4,574	51	3,420	44	5,846	64
Sept.	98,485	72	387	26	3,168	36
Oct.	3,547	51	397	35	1,588	39
Nov.	27,173	27	488	13	593	12
Dec.	15,396	45	805	21	1,268	22
Total.	153,966	329	6,251	183	14,957	298
Mean, July-Dec.	25,661	54	1,041	30	2,492	49
Mean of Year.	21,601	45	1,141	32	7,249	62

Commenting upon the above table, the Analysts say: "Taken as a whole, it is highly satisfactory as regards the efficiency of combined storage and filtration in producing a water unexceptionable for domestic use. On two occasions, the bacteriological condition of the water in one of the clear-water wells was above the average; the number of microbes rising to double what we regard as a proper, although severe, standard for the water supply of a city like London. This condition was, however, only temporary; and the microbes present were altogether of the harmless river kinds. It must be kept in mind that we have bacteriologically examined 3249 samples during the past year, instead of only 348 examined in 1896. We now know from day to day the efficiency of each filter in use. The character of the supply of the respective Companies is therefore much more continuously and severely scrutinized than can possibly be the case when bacteriological examinations are taken at intervals of a week or a month. The result of this continuous examination is that we are in a position to immediately inform the Engineers of the Companies of the commencement of any deterioration in the action of the filters."

MID-SUSSEX WATER-WORKS ARBITRATION.

Westminster Palace Hotel—Wednesday, Jan. 12.

(*Before Sir* George B. Bruce, *Umpire.*)

The proceedings in this arbitration case (see *ante*, p. 85) were brought to a close to-day.

Mr. R. E. Middleton, M.Inst.C.E., was Arbitrator for the Company; Mr. James Mansergh, M.Inst.C.E., for the District Council. Mr. Cripps, Q.C., M.P., and Mr. Scott Fox appeared for the Company; Mr. Balfour Browne, Q.C., and Mr. Boxall represented the Council.

At the opening of the proceedings, a report by Mr. Davey was handed in, showing that the average quantity of water pumped at the Company's works per 24 hours, taken over a period of five days, was rather more than 176,000 gallons.

Mr. Balfour Browne then addressed the Arbitrator on behalf of the District Council. He said they had now the conveyance of the freehold land

at Balcombe, upon which the pumping-station stood; but this document was not altogether satisfactory, because, though it was a conveyance of land, there did not seem to be any protection of the water rights. The test by Mr. Davey showed that there were 176,000 gallons of water available daily; but this supply, though satisfactory for some time to come, was not so unless assured to the holder of the land. There was, however, no such assurance, because there was no clause in the conveyance that no one was to sink a well within a certain distance. It therefore depended on the owner of the neighbouring property as to how long the water would be available to the owner of the Balcombe works. Possibly some authority might purchase a piece of land adjacent, sink a deeper well than that of the Mid-Sussex Company, and thus drain away their water; and the locality was just the place to which an authority would go, because it was proved that water was there. This matter of course only went to the question of the security the Council had for the supply of water continuing to be available. Referring to the figure of £28,900 given by his witnesses as the structural value of the concern, Counsel pointed out that the corresponding figure in the accounts was £48,692. The difference was due to the fact that the accounts did not purport to show what had been expended, but what the books said had been expended. There was considerable doubt regarding this larger figure, which he asserted was made up, not of sovereigns, but of payments in shares, provisional obligations, and so on. If the structural method of valuing was the right one, he emphasized the fact that there had been practically no criticism of the Council's valuations; and as to costs, he thought that in this case, having regard to the circumstances, the Company should be allowed them. Mr. Cripps had said that, if the Umpire presumed to value the concern according to the ideas of the Council's valuers, he would seek to set aside the award. But there was no rule for the making of a valuation; and the question here was one entirely for the Umpire: What was the value of the goodwill? If the Company were not to be disturbed at all, the goodwill would be a fair and reasonable calculation of the future profits. But this was not the position here; for the Company started under an Act by which they were to quit any time after the completion of the works, on the Local Authority giving them warning. Where, then, was the goodwill? In ordinary cases in which the multiplier was applied to the maintainable revenue, the assumption was that the revenue would be maintained in perpetuity; but under section 91 of the Act, as he had shown, there was no perpetuity whatever. There was a revenue in this case to multiply, but it was a small one; and in considering it, they must not go beyond the Act. Regarding the claim for prospective supply, he pointed out that for years past many people in the area had not been taking the water, and so were not likely to commence to do so, and, further, as to Ardingley, where the Company had no mains at present, would anyone trust them when for years they had not thought it worth while to lay mains there? The whole claim for prospective supply was hypothetical from beginning to end.

Mr. Cripps said the witnesses on both sides, save for the different interpretations they placed on section 91, were in substantial accord on matters of principle. Under the section they had to fix the price to be paid "for the undertaking, property, rights, powers, and privileges" of the Company; but there was nothing to show that they were to consider these things on any exceptional basis. There was no suggestion as to structural value, such as they found in the Tramway Acts, nor any suggestion of eliminating the element of prospective value if it existed. They had not to diminish in any way any value which the undertaking really bore. Suppose the notice had been given before the Company had earned any profit. On the basis adopted by the other side, the Council would have got the concern for nothing. Everyone, of course, knew that structural value was not value. There was no instance where any umpire or arbitrator had ever adopted structural value as the basis of his valuation without being specially directed to do so by Act of Parliament. Undoubtedly, the proper interpretation of section 91 was that it merely fixed the time at which the purchase should take place, and in no way limited the principle of valuation. It was quite apparent, too, from Mr. Mansergh's report to the District Council, that he never thought section 91 excluded consideration of prospective value. Mr. Corbet Woodall, one of the Council's witnesses, in his evidence, said he could not imagine any sane person investing money in the concern with such a clause as this in its Act; also that it would be palpably unfair to value the undertaking, after five or six years of work, at merely the cost of the buildings and plant. He (Mr. Cripps) quite agreed that it would be "palpably unfair;" but he denied that the palpable unfairness was found in section 91. Why should they interpret this section so that it was palpably unfair, particularly when the section was capable of a perfectly fair construction? In all cases where structural valuation was to be taken, it was so stated distinctly. Counsel then went in great detail into the respective valuations, with the object of showing that there was a general consensus of opinion that the figures put forward by Mr. Hill and Mr. Hawksley were correct. On the valuation of the present revenue of the Company, there was only a difference of £100 between the two sets of witnesses; and as to prospective value, there again the witnesses were agreed, unless they interpreted section 91 in the sense of robbery. He went on to quote the two expert witnesses for the Council; showing, as he contended that, putting aside the special construction of section 91, the principle adopted by Mr. Hill and Mr. Hawksley regarding prospective value was that which was customary in all these cases, and the only just one. Further, Messrs. Woodall and Fenwick could not suggest where Messrs. Hill and Hawksley had gone wrong. Passing on, he said Mr. Davey's report demonstrated that the water supply was ample, and it was admitted that its quality was good. Mr. Cripps, the chemist who analyzed a large number of samples of the private well water, proved that in some 60 or 70 per cent. of the cases the water was utterly bad; and not only was it bad, but they had it in evidence that it was quite insufficient. Could anyone therefore imagine a more favourable field than that possessed by the Company for the maintenance and extension of their profits? And these future profits had been very moderately estimated; for though it would be fair, on the figures, to take £4 per customer, they only took £1·64. Evidence had been called to show the small likelihood there was of more persons taking the water; but, after a review of their evidence, he asserted that it rather tended in a contrary direction. Returning to section 91, he asked what limitation it contained of the power of valuing the concern in the ordinary way. What word suggested structural valuation, or the exclusion of all the elements which should be considered in order that they might come to a fair determination between the parties? The mere fixing of the date of transfer had nothing to do with the valuation as between the parties. Parliament could not have intended, and he was sure it did not intend, that these particular water shareholders should be deprived of the protection which was always given in such cases. There was no difference between this clause and the one which customarily appeared in Acts of this kind, except the date. The water-right point raised that day by Mr. Balfour Browne was only an after-thought. There was no real risk; and he did not believe there was any conveyance which protected wells, excepting in cases of Acts of Parliament. In conclusion, he referred to the perpetual mortgage debentures which he thought it had been understood the Company were to pay off.

Some conversation took place regarding the debentures. Mr. Cripps offered to transfer them to the Council, and adjust the figures on this basis. The offer, however, was not accepted. He then remarked that the Company might require an Act to finally deal with them. After further discussion, the matter was left; no definite arrangement having been made. Some further conversation ensued regarding the fact that the time within which, under the Act, the Umpire was to make his award would expire on the 20th inst. Eventually, the Umpire undertook to make every endeavour to deliver his award before that date; failing which it was understood that application would have to be made to the Courts.

It was agreed between the parties that the transfer should take place as from Dec. 31 last.

The proceedings then terminated.

SHREWSBURY CORPORATION WATER SUPPLY.

The Proposed New Works—Local Government Board Inquiry.

Thursday, Dec. 30.

Mr. G. W. Willcocks, M.Inst.C.E., one of the Inspectors of the Local Government Board, commenced an inquiry to-day at Shrewsbury in regard to an application by the Corporation to borrow £48,000 for the purpose of a new water supply.

Mr. A. Graham appeared for the Corporation; Mr. Spearman attended on behalf of the Ratepayers' Association, which it was stated represented about 75 per cent. of the rateable value of the borough.

Mr. Graham, in opening the case, gave a short history of the water question in the town. He stated that in January, 1878, the existing works were purchased by the Corporation from a Company founded by the Shrewsbury Water-Works Act of 1856, which in turn had purchased the works of an earlier Company founded by an Act of 1827. Since 1878, the town had been supplied by water under the provisions of the Act of 1856, until the year 1896, when the Corporation obtained a Provisional Order under which they were applying for the present loan. Ever since the acquisition of the works, the source of the supply, the quality, and everything connected with it, had been a constant cause of anxiety to the Corporation. They recognized their responsibilities; but the difficulty of finding any method of improving the supply was, in the first place, owing to the fact that they were tied down by the Local Act, under which all borrowing powers were exhausted. That difficulty had, however, been got over by the Provisional Order. In the second place, a considerable portion of the ratepayers failed to realize the imperative necessity of a change; and this had been the cause of the inability of the Corporation to do anything in the matter. Eminent men had been called in to advise, and schemes almost without number had been brought forward; but every one of them met with the most bitter opposition. Of these schemes, four at least had gone to the arbitrament of the ratepayers as a whole. The first was for supplying the town from the Island of Poplars; the second was the Shelton scheme, which was rejected at a public meeting on sentimental grounds, as the sewage was still in the river; the third was an upland scheme, for bringing water from Church Stretton, which was quashed on account of the expense; and the present proposal had also been rejected. For twenty years the subject had been tossed to and fro, and a great deal of money expended; but he hoped it had not been wasted, because it had enabled the Corporation to satisfy themselves that they had now one of the best schemes it was possible to obtain. He then proceeded to point out the defects in the present supply. He said the water was pumped from the river—the intake being in the town—without being filtered; and from the service-tank it was supposed to go by gravitation all over the town. The intake was undoubtedly subject to pollution—in fact, it had been universally condemned. A great danger to health must necessarily issue; and typhoid fever, which was endemic in the town, was due to drinking Severn water. There was a second supply, called the conduit supply, which was equal to about half a gallon of water per head per day; and the result of the dual service was that the Severn water was largely drunk. He contended that no tinkering with the present supply could be tolerated, and that the proposal now submitted was the cheapest and best that could be devised. He then proceeded to explain the scheme; stating that an impounding reservoir, capable of holding seven days' supply, would be constructed at Shelton. There would be four filter-beds, through which the water would pass; and it would then be pumped through a composite main into a service reservoir at Hanwood, which would be large enough to hold a day's supply, or a million gallons. The intake would be removed 1½ miles above the present one; and the rate of filtration would be the slowest in England—being 0·95 gallon per square foot per hour. The impounding reservoir would be of the greatest advantage, as it would hold sufficient water for a week, so as to obviate the necessity of drawing from the river when the water was in a turbid state. Provisional contracts for the necessary land at Shelton and Hanwood had been entered into. As to the cost, he should call evidence to prove that at least £40,000 could be spent without any increase in the water-rate.

Mr. *W. Eddowes*, a surgeon of Shrewsbury, said that during his residence in the town he had met with several cases of typhoid fever, which he believed to have been caused by drinking Severn water. At a meeting of medical men held in October last, a resolution was passed which practically amounted to supporting the scheme now proposed by the

Corporation. They approved of it subject to the sewage being kept out of the river, and the water being properly filtered.

Dr. *Cureton*, who had called the meeting referred to, confirmed the statements of the previous witness.

The Rev. Prebendary *Moss* and the Rev. *G. T. Hall*, the Head Master and the Senior Assistant-Master at Shrewsbury School, expressed approval of the scheme.

Major-General the Hon. *W. H. Herbert*, an Alderman of the borough, said he considered the present water supply to be about as bad as it was possible to be. One reason was the danger of anyone drinking it; and other objections were that the water was filthily dirty, and there was very little pressure. He thought the new scheme was a good one.

Mr. SPEARMAN was about to cross-examine the witness, when

The INSPECTOR said it had been admitted that the present supply was bad, and that something must be done.

Mr. SPEARMAN said the improvement that would be effected by taking the sewage out of the river would not be sufficient, and a scheme to provide the town with water without any suspicion ought to be at once brought forward and carried into operation. He suggested that the new supply should be obtained from wells or from an upland source.

Mr. *E. B. Taylor*, M.Inst.C.E., of the firm of Messrs. Taylor, Sons, and Santo Crimp, said he was the Engineer of the scheme for supplying the borough with water. He agreed with the description given by the learned Counsel, and then by the aid of plans, &c., explained the details to the Inspector.

In an exhaustive cross-examination by Mr. SPEARMAN, witness said the proposed scheme meant the total abandonment of the present water-works except the Worthington engine, the boiler, and the distributing mains. In his opinion, the scheme was the best that could be devised for the supply of pure water to Shrewsbury.

Sir *E. Frankland*, F.R.S, said he had analyzed samples of water from the proposed intake; and the result had been to prove that, when the water was efficiently filtered, as proposed by the Corporation, it would be very good for drinking purposes. The slow rate of filtration would have the effect of reducing the organic impurity by from 20 to 25 per cent.; while it would take out at least 98 per cent. of the microbes. Moreover, exposing the water to the sunlight in the impounding reservoir would help materially in lessening the number of microbes going to the filter-beds.

In cross-examination by Mr. SPEARMAN, witness said he had no particular admiration for river water as distinct from any other; but he was bound to confess, taking into account the very serious epidemics of typhoid fever that had arisen from using water from deep wells and springs, that the matter must now be looked at from a different standpoint. He felt justified in stating that most of the serious typhoid epidemics had occurred in towns supplied from springs or deep wells, and not from rivers. Mountain waters were by no means perfect.

Dr. *E. Burd* was then examined by Mr. SPEARMAN in opposition to the scheme. He stated that from the first he had condemned the use of Severn water, and thought the town would be making a great mistake if they took to drinking it, as proposed by the Corporation. He had always advocated an upland scheme, and was strongly of opinion that the Council ought not to put it in people's power to use Severn water, which brought about a great deal of typhoid fever—in fact, it was almost always in the town. If they went in for a new scheme, he advised them to get the very best water possible. No amount of filtration would, in his opinion, secure people from attacks of typhoid. It might make water better, but it would not make it good.

In cross-examination by Mr. GRAHAM, witness acknowledged that he had not had any experience of sand filtration; but he based the positive judgment he had given upon the fact that the microbes could not be got out of the water. In reply to further questions, he stated that for a really good upland water supply, it would be worth while spending £100,000.

Dr. *Thursfield*, the Medical Officer of Health for Shrewsbury, expressed the opinion that, if the Severn water was efficiently filtered, it would make a good potable supply.

In cross-examination, witness said that supposing the river scheme to cost £48,000 with a large annual expenditure for working, and the Church Stretton scheme only to come to £60,000 with no such annual expenditure, he should certainly prefer the latter.

Friday, Dec. 31.

On the resumption of the proceedings,

Mr. *S. H. Keogh*, a Solicitor of Shrewsbury, said he had given special attention to systems for the filtration of water, and unhesitatingly declared that magnetic carbide of iron was the best material to employ for the purpose. It was virtually imperishable.

In reply to Mr. GRAHAM, witness stated that he was well acquainted with the proposed catchment area of the Church Stretton scheme, and was of opinion that it was far too small to supply the present needs of Shrewsbury, to say nothing of meeting an increased demand.

Dr. *Rope*, the Senior Surgeon to the Salop Infirmary, supported the upland scheme; while Dr. *Gepp* expressed the opinion that the river scheme of the Corporation would furnish water suitable for all household purposes.

Mr. *W. C. Eddowes*, the Surveyor to the Shrewsbury Corporation, examined by Mr. GRAHAM, said that some time ago he was requested to report on the Church Stretton scheme. He did so, and afterwards Mr. Deacon was called in to verify his report. He (witness) estimated the scheme to cost £111,434 to convey the water into the town; but this sum did not include anything for compensation. Mr. Deacon's original estimate for bringing the water to the borough boundary at Meole Brace was £96,669; and he advised the Committee to borrow either £120,000 or £125,000. Upon this report, circulars were issued to the ratepayers asking them to vote upon the scheme.

By Mr. SPEARMAN: The scheme was rejected. In January, 1892, he was asked to say which of the many plans proposed he thought the best; and he placed before the Committee three schemes, in the following order: Ceriogo Valley, Church Stretton and All Stretton, Castle Pulverbatch. Provided the Church Stretton water could be obtained at a reasonable price, he would prefer that. He estimated that they could get 20 gallons per head per day for a population of 33,000; but he felt there was not an unlimited supply. In addition to that, there was the conduit supply, from which he estimated they could get about 15,000 gallons per day. The Council did not come back to the river scheme until quite recently. He was not consulted on that scheme; they adopted it of their own free will. Questioned as to the state of the mains, he said some were very bad, while others were fairly good. In three years, 2¾ miles of new pipes had been put in. Some of the mains were between forty and fifty years old. The trunk mains were in a fair condition.

Re-examined by Mr. GRAHAM: After the rejection of the first Stretton scheme, there was a change in the constitution of the Water Committee. The promoters of the river scheme resigned, and the advocates of an upland scheme took their places.

Alderman *Butler Lloyd*, the Chairman of the Finance Committee of the Corporation, examined by Mr. GRAHAM, said he had heard the statement made that a loan of at least £40,000 could be obtained for the proposed works without any addition to the existing rate; and he believed it could be done. Economies could be effected, if an efficient scheme were adopted, whereby a saving of more than £2000 a year could be made. They could borrow £40,000 at 3 per cent., and pay it off in thirty years for £2040 per annum, and they would have a margin of £416. He had never heard the Pulverbatch scheme seriously mentioned as being possible.

In cross-examination by Mr. SPEARMAN, witness acknowledged that the medical men of the town recommended that scheme; but he said they knew nothing about the quantity of the water to be obtained by it, or the cost. The Corporation had spent thousands of pounds on the Church Stretton scheme, which was rejected; and they could not take up the Pulverbatch scheme just to play with.

Mr. *T. P. Deakin* stated that he was Chairman of the Water Committee of the Corporation, and was present at a meeting when Mr. Deacon had a consultation with the Committee in September, 1893, as to the Church Stretton scheme. His estimate was £96,000; and he suggested that the Council should borrow £125,000 to include everything. The Pulverbatch water was inferior to that of the river. If he had to choose between Stretton water at £100,000 and the Severn scheme at £48,000, he thought if there was an abundant supply of the former it would work out as cheap at £100,000 as the river water scheme at £48,000 or £50,000.

Mr. SPEARMAN then addressed the Inspector in opposition to the application. He said the Corporation admitted that if they went to the ratepayers again with the Severn scheme it would be rejected. Mr. Spearman referred to the reports of several authorities, which, he submitted, were against the scheme, and laid stress on the rejection by the ratepayers of the Severn scheme at a public meeting.

The INSPECTOR said he thought the opposition should say what they wanted. It was of no use to pull down; they should build up.

Mr. SPEARMAN replied that there were the wells scheme of Mr. Stooke, the Pulverbatch scheme of Mr. Baldwin Latham, and the Church Stretton scheme of Mr. Deacon. The latter scheme was perfectly feasible, and ought to be carried out unless the cost was absolutely prohibitive.

Mr. *G. F. Deacon*, M.Inst.C.E., was then called, and, in answer to Mr. SPEARMAN, said the Church Stretton scheme was a very good one. It would give an adequate supply, and, after providing full compensation water, leave something more than 750,000 gallons per day available for the town, which was about 25 gallons per head per day for 30,000 people. He believed the entire work could be carried out for £106,169; and he did not think the proposed Severn scheme could be completed for £48,000. In his opinion, the result would not be satisfactory in the end, though it might look right at first. If the Severn scheme was to be put on the same footing as the Church Stretton scheme, they must at least add £20,000 to the estimated £48,000 so as to bring it up to the same class of work. Witness gave figures to show that if the annual working expenses of the river scheme were capitalized, and the lump sum added to what he considered the proper cost of the scheme itself, a total of about £116,000 would be reached.

Saturday, Jan. 1.

Mr. *Deacon*, continuing his evidence this morning, stated that, supposing either scheme would cost £112,000, the annual charge to meet all expenses would be £5714 for the pumping scheme and £4352 for the gravitation one; but he thought that the former scheme would cost more than £112,000.

In cross-examination by Mr. GRAHAM, witness said his firm conviction was that 750,000 gallons a day could be obtained from Church Stretton in the very driest seasons, as the valley had exceptional facilities for collecting water. He admitted that by the pumping scheme they would get any quantity up to 1,100,000 gallons; but he said they would have to pay for every gallon pumped, and at exceptional prices. He had not included any working expenses in his scheme; but they would come to about £10,000—making the £112,000 into £122,000.

Mr. *T. Stooke* stated that in March, 1893, he submitted to the Corporation a well scheme; but nothing was done with it. The total cost of the scheme was to be £34,800; and he now said he could supply the town with pure water from wells at the Plex for a sum a little in advance of the amount mentioned. After the well scheme, the best way of supplying the town would, in his opinion, be from Church Stretton. He had never considered the Severn a suitable source.

Wednesday, Jan. 5.

On the resumption of the proceedings to-day,

The INSPECTOR said he found that the Church Stretton scheme had already been rejected by the ratepayers.

Mr. SPEARMAN admitted that this was so; but he said they were now changing their opinion, and putting it forward as a possible scheme.

The INSPECTOR: But supposing the Local Government Board should think this scheme a desirable one, the ratepayers would probably turn round again. Where should we be then? It is a very awkward thing to put forward a scheme already rejected.

Mr. SPEARMAN said he would shortly state how the matter stood. As the Inspector was aware, the river scheme was rejected. After that came an upland scheme. This was prepared originally by the Borough Surveyor, showing the cost to be something like £111,000. Upon this Mr. Deacon was called in; and he prepared a scheme showing that the

cost would be £96,000. Thereupon he was asked to give sundry explanations, and an interview took place His view was that he then stated that it would cost something more than £96,000, and that it would be well to apply to Parliament for £112,000 to cover everything; but the members of the Committee said that the sum was £120,000.

Mr. GRAHAM said the opinion of the Corporation was that Mr. Deacon told them to apply for £125,000.

Mr. SPEARMAN said he was not putting the view of the Corporation, but that of Mr. Deacon himself. When the question was brought before the ratepayers, it was stated that £120,000 was to be asked for; and at the time a circular was put forward in which they were told that there was not enough water at Church Stretton. What the opponents now said was that the ratepayers, when asked to vote, were entirely misled—first as to the cost, and secondly as to there not being sufficient water. They were misled again, because they were told that it would involve an increase in the rates of 6½d. in the pound. Alderman Butler Lloyd had stated that £40,000 could be raised without any increase in the present rate; and if this were applied to the Church Stretton scheme, the rate would be reduced to 2d. in the pound, which was a very material point for the ratepayers.

The INSPECTOR: But supposing, on further examination, it is found that the scheme would cost £120,000, what would you say?

Mr. SPEARMAN: Even if that were so, the extra cost to the ratepayers would not be 6½d. in the pound, but only 2d. The Ratepayers' Association will support the scheme if the cost is £120,000.

Mr. *Stooke*, recalled, stated, in answer to Mr. SPEARMAN, who asked him whether he thought there was sufficient water at Church Stretton for the requirements of Shrewsbury, that with a watershed of 1100 acres, at an altitude of 650 feet above Ordnance datum for the outlet-pipe, the area was capable of affording a million gallons daily, inclusive of compensation water. This was a broad statement, based upon the evidence previously given; but he did not consider Shrewsbury required anything like a million gallons daily.

Witness was cross-examined at some length by Mr. GRAHAM, in regard to a letter he sent to the Water Committee of the Corporation in 1885, in which he stated that he considered the river a fit and proper source of supply. But he said his opinion had changed a good deal since then. His objection now was principally as to pollution and turbidity.

Several members of the Ratepayers' Association next gave evidence in favour of the Church Stretton scheme; one saying that if it were brought forward he should use his influence to have it carried out, as he did not think that £120,000 was too much for a town to spend on getting a supply of pure water.

Mr. *T. Caink*, the Borough Surveyor of Worcester, expressed the opinion that the Severn water was fit to take in any case after proper filtration. They had no other supply in the city. In the proposed scheme for Shrewsbury, they would be enabled to filter at the rate of 1½ inches an hour, which was slower than he had ever heard of, and therefore more efficient. If the scheme were carried out at Shrewsbury, they would be in a very much better position than Worcester.

Thursday, Jan. 6.

Mr. *Taylor* was recalled this morning to give additional evidence. He said, with regard to the Stretton scheme, he had gone over the watershed, and had procured two records of the rainfall during the last twenty years. One showed an average of 30·27 inches; and the other, of 32·08 inches. His knowledge of the watershed, its elevation, and position, enabled him to estimate the average annual available rainfall at 33 inches. A 14-inch flow was equivalent to 955,000 gallons per diem; and after one-third had been allowed for compensation to streams, there remained 636,500 gallons for the supply of Shrewsbury, or 23·5 gallons per head daily with a population of 27,000. If a population of 35,000 was provided for, as he had done, the supply was reduced to 18·2 gallons per head. A gathering-ground of 1100 acres was not sufficient to give an ample supply to Shrewsbury. There were some important omissions from Mr. Deacon's estimate.

This closed the evidence.

Mr. SPEARMAN intimated that he had before him a petition signed by 1500 ratepayers against the river scheme, and it was intended to send it up to the Local Government Board. He then addressed the Inspector on the evidence given, and concluded by thanking him for the able manner in which he had conducted the inquiry.

Mr. GRAHAM having endorsed the latter observations,

The INSPECTOR replied, and the proceedings terminated.

THE ABSORPTION OF THE COMMISSION OF SEWERS BY THE CORPORATION OF LONDON.

Reference has already been made in the "JOURNAL" to the merging of the Commission of Sewers in the Court of Common Council of the City of London. This event occurred on the 10th inst., under the provisions of an Act passed last session; and, as a consequence, the Commission loses the separate existence as a governing body which it has possessed for more than 230 years. Though appointed annually by the Common Council, the Commission occupied the position of an independent statutory authority, enjoying most of the powers and performing the majority of the duties that fall to the lot of an ordinary Municipality. They had complete control over all sanitary affairs in the City, and had the full responsibility for its cleansing, lighting, and paving, and also for carrying out necessary improvements. It has previously been stated in our columns that the Commission came into existence after the Great Fire of London in 1666, which raged for five days, utterly consumed 15 City wards, and damaged 8 others. This represented a total destruction of 400 streets, 13,200 private houses, and 88 churches, together with St. Paul's Cathedral—in other words, about five-sixths of the City. The following additional particulars as to the origin and work of the Commission are taken from an interesting article on "The Government of the City of London" which appeared in "The Times" last Tuesday.

"Scarcely had the ruins of the Great Fire done smouldering, before the people began to think how they could best rear a fresh London on the blackened site of the old one; and the opinion wisely prevailed that the opportunity of reconstructing the City on improved methods should not be neglected. The Plague of the previous year—which was officially stated to have carried off more than 97,000 persons, or nearly one-fifth of the population—had taught the evils of insanitary conditions as clearly as the Fire had shown the dangers of narrow streets and alleys, among whose timbered and thatched tenements fire spread with such marvellous rapidity. Above all things, it seemed necessary that the new houses should be of brick; that the new streets should be broader and on a more uniform plan than the old ones; and that a system of drainage, of which there had been none before, should be carried out. It was with the view of securing the latter advantages that in 1667, the year following the Fire and two years after the Plague, there was passed an Act for the Rebuilding of the City of London, which provided 'that the number and places for all common sewers, drains, and vaults, and the order and manner of paving and pitching the streets and lanes within the said City and Liberties thereof, shall be designed and set out by such and so many persons as the said Mayor, Aldermen, and Commonalty, in Common Council assembled, shall from time to time authorize and appoint under their Common Seal, or the more part of them.' It was further provided that the persons so appointed should have authority 'to impose any reasonable tax upon the houses within the said City and Liberties thereof, in proportion to the benefit they shall receive.' It was the body of persons so chosen who became the Commissioners of Sewers, and upon whom fell the more immediate responsibility of seeing that the City of London was reconstructed on safer and more sanitary principles. The powers thus bestowed on them by Act 19 Car. II., cap. 3, were confirmed and enlarged by many subsequent Acts. Thus in 1670 the Commissioners obtained fresh powers as to street cleansing and other matters; in 1771 there was a consolidation of the various Acts under which they worked; and in 1817 they obtained authority to effect street improvements, to pave, cleanse, and water the streets, to regulate encroachments, and so forth. In 1848 there was a complete reconstruction of the duties of the Commissioners by what is known as the City of London Sewers Act, which, supplemented by another Act in 1851, finally established the powers according to which the work of the Commissioners has since been carried on. Thus a body which was no doubt in the first instance intended to act only temporarily in overcoming the ravages of the Great Fire, became, in the course of time, the real municipal authority in the City of London.

"It is this anomalous state of things that has, no doubt, been largely responsible for the attacks that have been made on the City Corporation from time to time, and especially as regards the allegations that that body was one which possessed the honours of a Municipality without actually performing the functions thereof. At the time, more especially, of the Royal Commission on the Government of London, it was significantly suggested that 'the Commissioners of Sewers were a useful body, and should be preserved.' The inference drawn from this suggestion was that the Commissioners ought to be allowed to absorb the Corporation; and the latter body, being the older of the two—for the Court of Common Council has been in existence since 1200—did not like the idea. It resolved, therefore, to absorb the Commissioners instead; and this it is now doing in virtue of the City of London Sewers Act, 1897, which provides for the execution of the powers, authorities, and duties of the Commissioners by the Common Council of the City—the actual transfer being fixed for Jan. 10, 1898. From that date, therefore, the elaborate organization gradually effected during the course of 230 years by the Commissioners of Sewers as a distinct statutory body will be transformed into a Public Health Department of the City Corporation, and the government of London will have one body the less. There is, in fact, to be a unification, not of the City Corporation with the London County Council, but of the Commissioners of Sewers with the City Corporation. That is to say, the City Corporation seeks to save itself from being swallowed up by the County Council by itself swallowing up the Commissioners of Sewers.

"Full credit is due to the Commissioners for the splendid work they have done during the course of their lengthened career—work for which, no doubt, such credit has been given by the majority of people to the Corporation rather than to those to whom it is actually due. From being the place of plague and pestilence, which it was only two years before the Commissioners started work, the City of London has achieved the reputation of being the healthiest and best governed city in existence. During the last 45 years (to go no farther back in history) the Commissioners have spent nearly £2,500,000 in improvements. In that period, nearly every street of any importance in the City has been more or less improved; while among those which have been widened throughout may be mentioned Newgate Street, Ludgate Hill, Poultry, Queen Street, Great Tower Street, Eastcheap, Threadneedle Street, Upper Thames Street, and Liverpool Street. What this means in regard to public convenience—apart from the opportunities afforded for the construction of a better type of buildings—can be best judged by considering for one moment the extent of the street traffic in the City of London. The actual resident population is, of course, a steadily diminishing quantity. From 112,063 in 1861, it shrank to 74,897 in 1871, to 50,652 in 1881, and to only 37,694 in 1891; whereas the mercantile and commercial population, representing persons who pass the entire day in the City at various occupations, has increased from 170,133 in 1866 to 261,051 in 1881, and 301,384 in 1891. But the most striking figures are those of the day census, according to which there entered the City during the course of 24 hours on May 4, 1891, no fewer than 92,372 vehicles and 1,186,094 persons on foot or in carriages. As the City of London represents a space only about one mile square, the wisdom of the Commissioners of Sewers in carrying out their policy of street widening in order to meet the requirements of this enormous traffic is self-evident. Then the Commissioners have spent, during this same period of 45 years, upwards of £200,000 in clearing sites and erecting artizans' dwellings, upwards of £85,000 in acquiring depôts in connection with the Cleansing Department and the erection of stabling, refuse destructors, &c., together with large sums on many other undertakings. Yet so well have they husbanded their resources, that they have a rating margin of 6d. in the pound, and their liability on loans, which is annually decreasing, is only £1,405,000.

"As the Sanitary Authority for the City of London, the Commissioners have not only had complete control of the streets and public ways of the City, but have been responsible for paving and cleansing the

streets. In this direction, they were the first public authority to encourage asphalte paving; while, in spite of the magnitude of the traffic, the streets of the City have the reputation of being the cleanest in the country. Since 1867 the work of scavenging and removal of dust, previously left to contractors, has been done by the Commissioners' own staff. In 1875 they purchased Letts' Wharf, in the Commercial Road, at a cost of £24,500, where accommodation for workmen and appliances for dealing with the City refuse have been constructed at a further cost of £25,300. To Letts' Wharf an average of 240 loads of dust, sweepings, and refuse are taken from the City every day, representing about 75,000 tons in the course of a year. At the wharf the refuse is sifted and sorted, that which is worth anything being sold, while the remainder is consumed in a destructor, which was set up in 1884 at a cost of £12,000, the smoke and vapour passing through superheated furnaces, and then to a chimney shaft 150 feet high. As for the cleansing of the streets, the work in the main thoroughfares begins at eight o'clock in the evening, and generally finishes about eight or nine in the morning. In hot weather, the main streets are disinfected and deodorized every 24 hours. . . . As the Lighting Authority for the City, the Commissioners began experiments in the use of electricity for street lighting so far back as 1878, when the Holborn Viaduct was illuminated on the Jablochkoff system; and they have entered into contracts for lighting the whole of the City by electricity—by this means supplementing their lighting of the main thoroughfares, which had been carried out by the autumn of 1893 at a cost of £12,000 per annum. Then again, in 1887, when there was a great outcry against the charges of the New River Company, the Commissioners sank an artesian well which, while giving a supply of water to their artizans' dwellings, demonstrated the possibility of obtaining an adequate quantity of water of 'admirable quality' (according to the Medical Officer of Health), from wells in the chalk formation to supply the City generally."

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Treasurer M'Crae, of Edinburgh, was the author of a curious incident in the Edinburgh Town Council this week. A copy of the Parliamentary Bill of the Edinburgh and Leith Gas Commission had been sent to the Town Clerk. The Treasurer said he thought the Gas Commission should take the Corporations of Edinburgh and Leith along with them, when they were asking for the powers they sought. They were, he said, proposing to expend £400,000 upon new works; and on this question there was considerable difference of opinion in the city, as to the advisability of purchasing the particular site which had been selected. The Gas Commissioners' Act provided that, if there were any deficiency in their revenue, they were entitled to apportion the amount between the Corporations. This showed that the Corporations had a great interest in any action the Gas Commission might take, in expending such a large sum of money. He would like to know when they were to have an opportunity of discussing the Bill. Bailie Kinloch Anderson said there was little fear of the assessment ever being imposed, because the Commissioners had power to raise the price of gas, to meet any deficiency which might occur. The Corporations, however, sent representatives to the Gas Commission, to attend to their interests; and if they disapproved of the action of those representatives, it was quite open to them to call them to book. As a Corporation, he thought they should leave the matter in the hands of their representatives on the Gas Commission. The Bill was sent to the Town Clerk with the intention of the Town Council discussing it. This explanation having been made, the Bill was sent to the Lord Provost's Committee, to be considered and reported upon; and then, of course, it will be open for any member of the Corporation to discuss it. Now, this is just exactly what would have happened had the Treasurer kept silence. He must have been eager to "have his breath out" about something. What it was, one can only judge by inference; and my inference is that it was the question of site, and not the expenditure of money, which was troubling him. Where he finds considerable difference of opinion upon the subject, I cannot tell, because the feeling is almost unanimous that the Commissioners have made the best bargain possible. To go a step further, what good will discussion in the Town Council do? The Corporations appoint the members of the Gas Commission; the Commissioners make themselves acquainted with all questions relating to gas supply; they hold public meetings, at which they explain their actions; and unless it were wanted to draw them upon something which they have not disclosed, there is no need for the Corporation considering what they do. But the Corporation have no duty to supervise the action of the Gas Commission; and when the discussion comes on, those members of the Gas Commission who are in the Town Council are under no obligation to divulge anything more than they please. While there may be no suspicion of there being anything underhand in what the Gas Commissioners have done, it must not be lost sight of that the time for lodging petitions against the Bill has not yet expired; and it would be a most regrettable matter if any meddlesomeness on the part of the Town Council should suggest points of opposition, and lead to the Bill being petitioned against. On this ground, it is to be hoped that the Gas Commissioners who are in the Town Council will act together, and resent interference with their policy.

I now come to a subject which requires delicate treatment. It is the old question of the employment of carburetted water gas for enrichment purposes in Edinburgh; and again it is in the Correspondence column of the "Scotsman" where it crops up. The writer this time is Mr. Robert Usher, distiller, of Edinburgh. His grievance is that carburetted water gas has been introduced without warning. Some months ago, he says, he brought the subject under the notice of the Public Health Committee of the Corporation. Then followed the report by Sir Henry Littlejohn, already published in the "JOURNAL," and after that the announcement that a conference was to be held between the Public Health Committee and the Gas Commissioners. On Dec. 2, he was given to understand by a gentleman who, he thought, was in a position to know, that the obnoxious gas had already been introduced; and a friend of his wrote to the Secretary (the Clerk) to the Gas Commission, to ask if this were the case. The reply he received was that water gas had not been introduced into the mains. As, however, he had not heard the result of the conference, he again wrote a letter to the Convener of the Health Committee, in which, among other things, he asked if an assurance could be given that water gas was not being introduced into the mains. The answer contained the statement that as a matter of fact they found, at their interview with the Gas Commissioners, that the gas had been in use for the previous six weeks. He asks if this is a fair way to treat the public; and he charges the Gas Commissioners with giving a misleading reply. He does not know whether any steps can be taken to make them discontinue the use of the gas; but he would recommend householders to shut off the supply at the meter every night before retiring. Now, except as a popular epistle, this letter can hardly be said to be effective. The Gas Commissioners proceeded with the utmost openness in the introduction of the plant for the production of carburetted water gas. They let the contract for the supply of oil several months ago; and the plant having been completed, the natural course to follow was to start it. To have kept the apparatus standing idle, would have been the best argument the opponents of water gas could have. Thus far I am entirely with the Commissioners; but I think that, having announced the fact that a conference was to take place, the result of it should have been made public. To be fair, however, it is not so much the Commissioners as the Corporation who are to blame for this. The Commissioners went into the conference convinced of the rectitude of their policy; it was the Corporation Health Committee who desired to be assured on the subject. Are they assured? If so, some means should have been taken to let the public know it. If not, it does not lie with the Gas Commissioners to announce the fact; and the Health Committee, in concealing it, would be the delinquents. It may be that, on account of circumlocution in corporation work, the result of the conference has not yet come out, but will do so in due course. Of such, however, popular clamour takes no account. Mr. Usher's letter only appeared yesterday; and is not replied to to-day. There might be a reason, or reasons, for this; and so I will say no more, lest I should turn out to be pre-judging the matter. I do not touch the question of the alleged misleading statement, because the proof of it is meagre; and I quite expect that a perfectly satisfactory explanation on the point can be given.

Some people, even those who are considered worthy of sitting in the position of councillors, are like children—when they set their affection upon anything, they are not happy till they get it. To this class it appears to me that a party in the Police Commission of Broughty Ferry belong. They have set themselves in a position of antagonism to the Peebles oil-gas process. It has always been a bugbear to them; and they have now had the supreme felicity of moving, at a meeting of the Commission, that it be discontinued. The prime mover was a Mr. Hood. His motion, submitted at a meeting of the Police Commission on Monday night, was to the effect that on the conclusion of the present financial year, the oil-gas plant be laid idle, and that gas be manufactured exclusively from coal for the next year. He asked the members to dismiss from their minds any idea of personal feeling or interest on his part. He believed that what had been done at the gas-works had been entered upon with the best of motives; but he thought it would have been a good thing if there had been less of the personal element introduced. Extreme danger attended the manufacture of gas from oil; and although experiments had been going on for 26 years, no means had yet been found to avert this. Recently the Perth plant had been burned down; and in Broughty Ferry they had had some narrow escapes. The quality of gas they had been getting had not been up to the mark; the average being 25·09 candles—and this from coal capable of producing 22-candle and oil capable of producing 90-candle power gas. Not only so, but the gas had been very variable in quality; and the consumers had not got any benefit as regarded price, notwithstanding the enormous reduction. Between 1892 and 1894, the consumption advanced 515,000 feet; and yet the number of consumers remained stationary. From 1894 to 1896, it advanced 5,776,000 feet, or 20 per cent.; and yet the number of consumers only increased by 2 per cent. These figures were not capable of explanation by him otherwise than that they were forced to burn a larger quantity of gas in order to get light. Bailie Christie, the Convener of the Gas Committee, in moving the previous question, said that nearly all the extravagant and ridiculous statements against the manufacture of gas from oil could be urged with the same force, although gas manufactured from coal was sent out of the works to-morrow. With regard to fires, Mr. Hepworth, whom they had consulted, had assured them that under the conditions observed at their works there was no more danger from using oil than coal; and this statement was corroborated by many experts, and was proved by the question of insurance—the companies making no difference in the premium. They had no difficulty in getting 9s. to 10s. a ton for their coke; and so long as this obtained, and oil and coal remained at the present price, they would simply be throwing away from £500 to £600 of the ratepayers' money by laying the oil-retorts idle. For enrichment purposes, oil gas was unquestionably more permanent than coal gas. It had a great advantage in securing freedom from impurities; and the gases constituting it were of a higher character than those of coal gas. If Mr. Hood's motion were passed, they would require new purifiers before they could send out gas of the quality they were at present producing; and this the Manager estimated would cost from £200 to £300. Another bench of retorts would also have to be built at a cost of £300. The motion was defeated by seven votes to three. It is thus evident the promoters of the movement have very little standing in the place. They appear to have been spoiling for an opportunity to have the working of the process stopped. They have had their chance; and I hope they will be satisfied with the defeat they sustained, and will allow the gas-works to be conducted in future a little more smoothly.

At the Perth Gas Commission on Monday, Mr. Alexander moved that the quality of the gas supplied be not less than of 26-candle power. They could not, he said, shut their eyes to the fact that there had been great complaints since the Act was passed which authorized them to reduce the illuminating power to 20 candles. Bailie Wright, the Convener of the Works Committee, said it did not trouble him what the quality of the gas might be, so long as they could keep the consumers, when they got good gas, from complaining of smoky ceilings. The motion was adopted unanimously. I think the Commissioners have sufficient in hand just now, in connection with the removal of their works to the new site, without taking up the subject of the quality of the gas, and putting an additional burden upon the shoulders of Mr. Wilson, their Manager. If the motion had been that the gas to be supplied from the new works should

be of that quality, I could have understood it; but it does appear to me, considering the troubles which have to be contended with in the keeping up of the supply from the existing works, that it would require more reasons than have been given to justify the addition to the cares and labours of the staff which will be necessitated by this resolution.

The members of the Corporation of Aberdeen on Wednesday paid their annual visit of inspection to the gas and electric lighting works. Everything was found to be in the best of order. In the gas-works, attention was attracted to the plant for the recovery of cyanogen, which is now in operation; being the second of its kind erected in Scotland.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 15.

Sulphate of Ammonia.—Throughout the week, the market has been active; and already parcels have been promptly picked up at hardening prices. At the close, quotations are very firm at £9 12s. 6d. to £9 15s. per ton, f.o.b. at the ports. There has been a good volume of direct business, indicating that consumers have considerable requirements to fill, and that they are abandoning all hope of lower prices later. Makers continue to market their output as it becomes available; and in this they act advisedly, as so long as they are not hampered by stocks, they must remain masters of the situation. More attention has been given to the forward position; and a large business has been done in Scotland. In the early part of the week, January-June was done repeatedly at £9 10s. per ton, ordinary terms, f.o.b. Leith, and subsequently at £9 12s. 6d. per ton—the closing quotation being £9 15s. London quotations have been advanced to £9 15s. per ton for January-June, Beckton terms.

Nitrate of Soda is firm at 7s. 6d. per cwt. for ordinary, and 7s. 7½d. for fine, quality.

LONDON, *Jan.* 15.

Tar Products.—This market is in a bad way in many respects; and particularly in regard to the light products, all of which have seriously fallen in value. An important sale of benzol is reported, at a price equal to 1s. 4d. f.o.b for nineties, with fifties at a corresponding rate. Pitch is extremely weak, with lower prices obtaining everywhere. The state of this article is remarkable, having regard to the undoubted fact that distillers have less stocks than they usually hold at this time of the year; while it is notorious that buyers are working from hand to mouth. Some business is reported in anthracene, but the price is unremunerative. At the present rates, there will probably be a great shrinkage in the annual production of this article. Average market quotations are as follows: Tar, 12s. 6d. to 16s. 6d. Pitch, east coast, 17s. 9d.; west coast, 14s. 6d. Benzols, 90's, 1s. 4d.; 50's, 1s. 5d. Toluol, 1s. 9d. Solvent naphtha, 1s. 7d. Crude, 30 per cent., naphtha, 7½d. Creosote, 2⅜d.; liquid, 2¾d Heavy oils, 45s. Carbolic acid, 60's, 1s. 11d. Naphthalene, 50s.; salts, 30s. Anthracene, "A," 5½d.; "B," 4½d. to 4⅝d.

Sulphate of Ammonia is firm at improving rates. A large advance in the value of this article has taken place; and considerable business has been done at prices ranging from £9 12s. 6d. to £9 15s., less 3½ per cent. in all positions. Makers now ask 10s. more for spring delivery.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—There is still very little move one way or the other in the coal trade of this district. The better qualities, suitable for house-fire purposes, continue in but indifferent request for the time of the year; and notwithstanding the recent holiday restrictions of the output, very little stock has been filled up, while supplies are ample. Prices are not more than maintained at list rates, which may be taken as representing the full figures likely to rule during the remainder of the winter. Best Wigan Arley does not average more than 10s. 6d. to 11s. per ton at the pit; Pemberton four-feet and seconds Arley, 8s. 6d. to 9s.; and common house coals, 7s. to 7s. 6d. The lower classes of round coals are moving off fairly well, both for inland requirements and for shipment; and there are no excessive supplies on the market. Prices are steady at about 6s. 6d. per ton as the minimum at the pit mouth; and 8s. to 8s. 3d., for steam coal delivered at ports on the Mersey. Some collieries are short of slack, owing to less than the average quantity of round coal now being screened. But there is no actual scarcity of engine fuel on the market; and prices are not more than steady at about 3s. to 3s. 6d. per ton for common, 3s. 9d. to 4s. 3d. for medium, and 4s. 6d. to 5s. for best sorts. There is, however, a prospect that for chemical manufacturing purposes there will be an increased demand upon some qualities of slack—especially those suitable for coking purposes.

Northern Coal Trade.—Though the pressure of the demand that followed the beginning of work after the holidays has now passed, yet there is great activity in the coal trade of this district; and there is a strong demand for coals—much above that usual at this time of the year. Best Northumbrian steam coals are rather higher in price; being now quoted 8s. 6d. per ton f.o.b.; second-class steam coals are 8s. per ton; and steam smalls, 3s. 3d. The pits are fully at work; the shipments being very heavy. There is also a better inquiry for manufacturing coals; some factories and shipyards working fuller time. In regard to gas coals, the demand is still very heavy, though it is beginning to show some signs of declension. The tenders for the first of the large contracts for gas coal this year have been sent to Copenhagen this week. The quantity needed is about 110,000 tons, spread over the season. Last year the price paid was about 7s. per ton f.o.b.; and the prices now asked range, it is thought, from 7s. 10d. to 8s. 4d. per ton. It is probable that a week or so will elapse before a decision is arrived at on the tenders. There is no alteration in the gas coke trade this week.

Scotch Coal Trade.—Trade continues healthy, with a prospect of steadiness for some time. This is largely owing to the expectation of an early opening of the Baltic ports, consequent upon the very mild winter. In the case of ell, which is a coal that is largely exported, owners are being asked to look ahead, but are indisposed to do so except at a material advance in price. The prices quoted are: Main, 6s. 6d. to 6s. 9d. per ton f.o.b. Glasgow; ell, 7s. to 7s. 3d.; splint, 7s. 6d. The shipments for the week amounted to 93,096 tons—a decrease of 66,991 tons on the preceding week, and of 5421 tons on the corresponding week of last year.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST

Referred to on p. 110.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 14	10½	Alliance & Dublin 10 p. c.	24—25	..	4 4 0
100,000	10	,,	7½	Do. 7 p. c.	16½—17½	..	4 5 8
300,000	100	Jan. 3	5	Australian 5 p. c. Db. .	105—107	..	4 13 6
200,000	5	Nov. 11	6⅛	Bombay, Ltd. . . .	6⅞—7⅛	..	4 9 7
40,000	5	,,	6⅞	Do. New, £4 paid .	5—5⅛	..	4 14 6
380,000	Stk.	Aug. 27	12	Brentford Consolidated	300—305	..	3 18 8
240,000	,,	,,	9	Do. New . . .	227—232	..	3 17 7
50,000	,,	,,	5	Do. 5 p. c. Prf.. .	145—150	..	3 6 8
159,375	,,	Dec. 15	4	Do. 4 p. c. Db. Stk.	134—138	..	2 18 0
220,000	Stk.	Sep. 15	11½	Brighton & Hove Orig. .	275—280	..	4 2 3
208,820	,,	,,	8½	Do. A. Ord. Stk. .	200—205	..	4 2 11
933,500	Stk.	Aug. 27	5	Bristol, 5 p. c. max. . .	130—135	..	3 14 1
420,000	20	Sep. 30	11½	British	56⅛—57⅛	..	3 18 3
50,000	10	Aug. 27	11½	Bromley, Ord. 10 p. c. .	25—27	..	4 5 2
71,000	10	,,	8½	Do. 7 p. c. .	20—22	..	3 17 3
500,000	10	Oct. 14	6	Buenos Ayres (New) Ltd	9¼—10	..	6 0 0
98,122	Stk.	Dec. 30	4	Do. 4 p. c. Db. Stk.	96—98	..	4 1 8
150,000	20	July 15	8½	Cagliari, Ltd. . . .	30—32	..	5 3 1
100,000	10	Sep. 30	8	Cape Town & Dis., Ltd.	17—18	+½	4 8 11
50,000	50	Nov. 2	6	Do. 6 p. c. 1st Mort.	59—61	..	4 18 5
550,000	Stk.	Oct 14	13½	Commercial Old Stock .	340—345	..	3 18 3
200,750	,,	,,	10½	Do. New do. . . .	255—260	..	4 0 9
200,750	,,	Dec. 15	4½	Do. 4½ p. c. Db. do.	154—157	..	2 17 4
800,000	Stk.	Dec. 15	12	Continental Union, Ltd.	250—255	..	4 14 1
200,000	,,	,,	9	Do. 7 p. c. Prf. .	214—219	+1	4 2 2
51,600	Stk	Aug. 27	14	Croydon A 10 p. c. . .	315—320	..	4 7 6
163,400	,,	,,	11	Do. B 7 p. c. . .	252—257	..	4 5 7
535,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p c.	138—142	..	3 13 11
60,000	,,	,,	5	Do. 5 p. c. Prf. .	140—143	..	3 9 11
486,090	10	July 29	11	European, Ltd. . . .	26—27	..	4 1 6
354,060	10	,,	11	Do. £7 10s. paid .	18½—19½	..	4 4 7
5,896,590	Stk.	Aug. 12	12½	Gaslight & Coke, A, Ord.	313—316	..	4 0 8
100,000	,,	,,	4	Do. B, 4 p. c. max. .	113—118	..	3 7 10
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	320—325	..	3 1 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf. .	150—155	..	3 4 6
60,000	,,	,,	7½	Do. G, 7½ p. c. do. .	222—227	..	3 6 1
1,300,000	,,	,,	7	Do. H, 7 p. c. max. .	204—209	..	3 7 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf. .	319—324	..	3 1 8
475,000	,,	,,	6	Do. K, 6 p. c. Prf. .	182—187	..	3 4 2
1,061,150	,,	Dec. 15	4	Do. 4 p. c. Db. Stk. .	138—141	..	2 16 9
294,850	,,	,,	4½	Do. 4½ p. c. do. .	155—158	..	2 16 11
908,000	,,	,,	6	Do. 6 p. c. do. .	205—210	..	2 17 1
70,000	10	Oct. 28	8	Hongkong & China, Ltd.	14—15	..	5 6 8
3,800,000	Stk.	Nov. 11	10	Imperial Continental .	215—220	..	4 10 11
376,400	100	Aug. 3	4	Do. 4 p. c. Dbs. Red.	99—102	..	3 18 5
473,600	Stk.	Aug. 12	3½	Do. 3½ p. c. Db. Stk. ,,	104—107	..	3 5 5
					* Ex div.		
75,000	5	Dec. 15	6	Malta & Medn., Ltd. .	5½—6	..	5 0 0
560,000	10£	Oct. 1	5	Met. of Mel- bourne 5 p. c. Db. / 4½ p. c. Db.	112—114 / 109—111	..	4 7 8 / 4 1 1
250,000	100	,,	4½			..	
541,920	20	Nov. 11	5	Monte Video, Ltd. . .	15—16	..	6 5 0
150,000	5	Nov. 26	8	Oriental, Ltd. . . .	6¼—8⅜	+¼	4 11 5
135,000	5	,,	8	Do. New, £4 10s. pd.	7—7½	..	4 16 0
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—2	..	4 0 0
60,000	5	Sep. 30	7	Ottoman, Ltd. . . .	4½—5	..	7 0 0
420,000	100	Nov. 2	6	People's Gas 1st M. Bd.	104—109	..	5 10 1
500,000	100	Dec. 1	6	of Chicago 2nd do.	103—108	..	5 11 1
250,000	10	Sep. 30	10	San Paulo, Ltd. . . .	16—17	..	5 17 3
135,000	Stk.	—	10	Sheffield A.	250—253	..	3 19 0
209,053	,,	—	10	Do. B.	250—253	..	3 19 0
447,427	,,	—	10	Do. C.	250—253	..	3 19 0
5,475,000	Stk.	Aug. 12	5½	South Metrop., 4 p.c Ord	143—146	..	3 11 11
1,416,667	,,	Jan. 13	3	Do. 3 p. c. Db. Stk. .	105—108*	+½	2 15 7
60,000	Stk.	Sep. 15	12	Tottenham and Edmonton A. / B.	285—295	..	4 1 4
60,000	,,	,,	9		205—215	..	4 3 9
182,380	10	Dec. 30	7	Tuscan, Ltd.	13¾—14¼	..	4 16 7
149,900	10	Jan. 3	5	Do. 5 p. c. Dbs. Red. .	100—103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	Dec. 30	10½	Chelsea, Ord.	335—340	+2	3 1 9
150,000	,,	,,	5	Do. 5 p. c. Prf. . . .	177—180	..	2 15 6
160,000	,,	,,	4½	Do. 4½ p.c. Pf. Stk., 1875	157—160	..	2 16 3
175,785	,,	Sept. 30	4½	Do. 4½ p. c. Db. Stk. .	160—165	..	2 14 6
1,720,560	Stk.	Oct. 14	7½	East London, Ord. . .	233—237	+1	3 3 3
654,740	,,	Dec. 30	4½	Do. 4½ p. c. Db. Stk.	162—165	..	2 14 6
390,000	,,	,,	3	Do. 3 p. c. Db. Stk..	105—107	..	2 16 1
700,000	50	Dec. 15	7½	G'd Junct'n, 10 p. c. max.	122—127	..	2 19 0
295,000	Stk.	,,	4	Do. 4 p. c. Db. Stk.	147—152	..	2 12 8
708,000	Stk.	Aug. 12	13	Kent	362—367	..	3 10 10
160,000	,,	,,	7	Do, New, 7 p. c. max..	215—220	..	3 3 7
1,043,800	100	Dec. 30	10	Lambeth, 10 p. c. max..	305—310	+2	3 4 6
406,200	100	,,	7½	Do. 7½ p. c. max..	227—232	+2	3 4 8
350,000	Stk.	Sep. 30	4	Do. 4 p. c. Db. Stk.	147—150	..	2 13 4
500,000	100	Aug. 12	13	New River, New Shares	452—457	..	2 16 10
1,000,000	Stk.	July 29	4	Do. 4 p. c. Db. Stk.	152—155	..	2 11 7
902,300	Stk.	Dec. 15	6	Southw'k & V'xhall, Ord.	165—168	..	3 11 5
126,500	100	,,	6	Do. do. 7½ p. c. max. .	157—162	..	3 14 1
489,200	Stk.	,,	5	Do. do. 5 p. c. Prf. .	175—180	..	2 15 6
1,019,585	,,	Oct. 14	4	Do. 4 p. c. A Db. Stk.	146—149	+2	2 13 8
1,155,066	Stk.	Dec. 15	10	West Middlesex . . .	315—320	..	3 2 6
200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	162—165	..	2 14 7
					* Ex div.		

Incandescent Gas Lighting at Liverpool.—Referring to an appeal made by Mr. Purcell at the meeting of the Liverpool City Council last Friday for the better lighting of the north-west portion of Liverpool, Alderman Sir Thomas Hughes pointed out that the Lighting Committee were proposing to deal with 27 miles of streets with incandescent gas lights; and the North end was getting a very fair share.

Completion of Gas-Works for Crowborough.—The gas-works which have been erected for the Crowborough Gas Company, Limited, and are designed for the supply of Crowborough, Rotherfield, and Jarvis Brook, were inaugurated last Tuesday by the Chairman of the Company (Mr. H. Arms). After the ceremony, those present dined at the Red Cross Hotel, outside which during the evening the Chairman gave the first public gas-light in the town by igniting a large gas star with the device "V.R." in the centre. The workmen were also entertained at dinner at the Red Cross Hotel; the Works Manager (Mr. W. Parks) presiding.

The Reigate Corporation and the Proposed Amalgamation of the Redhill and Reigate Gas Companies.—A provisional agreement having been entered into between the Redhill and Reigate Gas Companies for an amalgamation of these undertakings, the shareholders of the former Company are shortly to meet to consider it. However favourably the proposal may be regarded by them, it will not have the support of the Reigate Town Council, if we may judge from the fact that they have decided to oppose the Bills promoted by both Companies. The present is regarded by a local paper as an opportune moment for the Corporation to take steps to acquire the gas supplies of the borough, the profits from which, it is said, "in the near future cannot be estimated." It is asked: "Why should not this, in a sense, 'unearned increment' be secured, as far as possible, to the borough, and be devoted to reducing the rates and to the effecting of those innumerable improvements in which our beautiful town lags so far behind other municipalities of similar size?"

Norwich Water Company.—At the recent half-yearly general meeting of this Company, the report presented showed that, after payment of working expenses, debenture interest, and dividend on the preference shares, there remained a sufficient sum to pay a dividend on the ordinary shares at the rate of 6 per cent. per annum (deducting income-tax); and leaving £3589 to be carried forward. The Directors asked to be authorized to raise additional capital by the issue of 1000 ordinary shares of £10 each, and to issue debenture stock to the amount of £5000. On account of the increasing population of the city and the consequent demand for water, it has become necessary to construct additional works, both at Heigham and at Mousehold; the latter being more particularly needed in order to give a greater pressure to the higher levels of the city. The Directors are accordingly seeking statutory powers to construct these works and acquire land for the purpose, as well as to raise additional capital. A dividend at the rate of 6 per cent. per annum was declared. At the close of the business, a special meeting was held, at which the sanction of the shareholders was given to the raising of further capital. A vote of thanks was given to the Chairman and Directors for their valuable services during the half year, and also to Mr. John Ayris, the Manager, for his constant attention to the interests of the Company.

Sales of Shares.—At a sale of shares at Sunderland on Thursday, five £5 shares in the Sunderland and South Shields Water Company were sold for £13 5s. each. At Barnstaple last week, four original shares in the Barnstaple Gas Company, entitled to a dividend of 10 per cent., realized £25 12s. 6d. each. Ten "B" shares (7 per cent.) were sold at from £18 2s. 6d. to £18 5s. apiece. Eleven original shares in the Barnstaple Water Company fetched £30 each; five "B" shares, £20 to £20 5s.

Reductions in Price.—The Directors of the Horsham Gas Company have decided to reduce the price of gas from 4s. 2d. to 3s. 9d. per 1000 cubic feet, to take effect from 1st of April next. This concession to the consumers would have been made before, had it not been for the enormous increase in the rates and taxes which had taken place during the past twelve years. The Tiverton Town Council decided yesterday week to reduce the price of gas used for heating and motive power to 3s. 6d. per 1000 cubic feet. It was suggested that the reduction should be for all purposes; but it was explained that the object of the present movement was to encourage the day and summer consumption of gas.

The Southampton Corporation and the Gas Company's Bill.—At the meeting of the Southampton Borough County Council last Wednesday, a long report prepared by the Town Clerk (Mr. G. B. Nalder) on the Bill promoted by the Southampton Gas Company, noticed in another column, was presented by the Parliamentary Committee. He recommended the Council to oppose the Bill, in order to obtain the insertion of clauses fixing a uniform price for gas throughout the borough as extended, and providing for a higher standard of illuminating power. The report was adopted without comment. The price suggested by the Council is 2s. 6d., instead of 2s. 6d. and 3s., as now; and 16 or 18 candles in place of the existing standard of 14 candles.

South Molton Gas-Works Capital.—A discussion took place at the meeting of the South Molton Town Council last Tuesday respecting the question of re-investing the sum of £300 which the Corporation formerly held as shares in the South Molton Gas Company. Mr. J. Vernon, who brought the matter up, contended that the Corporation's property ought to be kept intact, and said that if the £300 were paid into the current account it would be lost sight of, and their permanent income would be reduced. Mr. D. Richards said he agreed that it was the duty of the Corporation to guard the property of the ratepayers, but there were considerations in this case which Mr. Vernon had not taken into account. In the first place, they had overdrawn their current account to the extent of £600, for which they were paying 4 per cent. interest; and if this motion were carried, they would have to withdraw £300 more, and invest it at perhaps 2 or 3 per cent. In the second place, the Council were pledged to pay off the purchase-money of the gas-works in twenty years, which was equal to the investment of £200 a year on freehold property every year for this period. They were thus doing their duty to posterity. He moved, as an amendment, that the £300 remain in the hands of the Council, to be used for the purpose of making advances to the gas-works purchase account from time to time as might be found necessary. Six voted for the motion and six for the amendment, and the Mayor (Mr. W. Moor) gave his casting vote for the amendment.

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Extensions at the Cromer Gas-Works.—In another part of the "JOURNAL," reference is made to the Bill which the Cromer Gas Company are promoting for the purpose of obtaining further capital and other powers, as well as additional land. This step has been necessitated by the rapid development of the undertaking, as the result of which extensive additions to the works have been called for. These have been designed by Mr. Percy Griffith, Assoc.M.Inst.C.E., the Company's Consulting Engineer; and they are at the present time being carried out under his superintendence.

Kirkham and the Fylde Joint Water Board.—The Kirkham Urban District Council have by a unanimous vote decided not to join the Water Board formed for the purpose of acquiring and working the undertaking of the Fylde Water Company. It was stated that neither the Fylde nor the Garstang District Council would join. Mr. Dickson, the Clerk, who is also Solicitor to the Company, stated that any profit made could not be used in reduction of the district rates. This statement will cause surprise to the ratepayers; for when the matter was before them, it was given out that much relief would accrue if the undertaking were acquired by the Local Authorities.

Lighting by Acetylene.—A firm of ironmongers at Weston-super-Mare recently made a successful demonstration of acetylene gas lighting in their town during two evenings on the occasion of a public function. The hall in which the event took place is usually lighted by 128 of Bray's No. 4 burners. These were replaced by 36 of the same maker's No. 00000 burners for acetylene, with a result that the hall was much better and more evenly illuminated. The generator used was one of the type made by Messrs. Read, Holliday, and Sons, Limited, of Huddersfield. The cost of the carbide spread over a period of eleven working hours was 10s., as against a cost of 15s. for a similar period with the use of coal gas at 3s. 4d. per 1000 cubic feet. The existing gas-pipes were utilized for the installation.

The Basis of Charge for Water at Burton-on-Trent.—Mr. Barrow's success in his fight with the South Staffordshire Water Company as to the basis upon which he should be assessed for the water-rate, will occasion the latter a good deal of trouble in the Burton-on Trent district. Already the Town Council are moving in the matter. At their meeting on Wednesday, Mr. King proposed that a deputation be sent to the Directors of the Company with a view to induce them to levy their rates on the rateable value of their customers' occupation, and not on the gross annual rental, where this system prevails at present. Some of the members, however, appeared to think this would be like going "cap in hand" to the Directors to secure what had been proved to be a legal right. Alderman Evershed, M.P., considered it most extraordinary that in one portion of the district the Company should charge on the gross rental, and in another on the rateable value. To his mind, such a position was absolutely indefensible; and instead of a deputation, he suggested that the Town Clerk should write to the Company, and ask them in what way they intended to remedy the anomaly. Ultimately the matter was referred to the Estates and General Purposes Committee with the object of carrying out Alderman Evershed's idea.

Suicide by Coal Gas.—On the night of Sunday, the 9th inst., William H. Sutton, the Assistant-Overseer of All Saints', Hastings, was found dead in his house as the result of suffocation by coal gas. The burners had been removed from two pipes, and the gas was turned full on—a crevice under the door being also stopped up. The deceased recently lost his wife. It appears that he was in arrear with the collection of the rates; and the Corporation threatened proceedings against the Overseers.

The Great Fire in the City.—The inquiry into the cause of the great fire which occurred in the City on Nov. 19 last, some evidence at which was given in the "JOURNAL" last week, was brought to a close on Wednesday, when the jury found that the conflagration was due to the wilful firing of a stack of goods by some person or persons unknown, and not to a gas explosion or spontaneous combustion. Questions were put to the jury as to the adequacy of the appliances and the water supply on the occasion; and they were answered in the affirmative. The rapid development of the fire was attributed to the style of the buildings, the narrowness of the streets, and the delay in getting the first steamer to work.

Mechanical Stoking at the Stroud Gas-Works.—Under the supervision of the Engineer and Manager of the Stroud Gas Company (Mr. G. Cutler), the works have during the past few years been equipped with modern gas-making plant to enable them to meet the increased demands upon them. An important feature of the improvements effected was an installation of regenerative furnaces, charging machinery, and retorts, capable of producing 500,000 cubic feet of gas per day, supplied by West's Gas Improvement Company, Limited. This was found so satisfactory that a further contract was entered into with the Company for a duplication of the plant, bringing it up to a productive capacity of a million cubic feet daily, when fully employed. The works were recently visited by a representative of a local paper, who, under the guidance of Mr. Cutler and the Secretary of the Company (Mr. G. F. Payne), had an exceptionally good opportunity of learning something about gas making, which may possibly prevent him committing errors as to this branch of industry to which writers for the Press seem at times peculiarly liable.

Douglas Town Council and the Gas Company.—Last Wednesday, the Douglas Town Council had before them the report of the Special Committee on the ridiculous proposal which was made a short time since, that steps should be taken to compel the Gas Company to make a payment to the Council in respect of the use made by them of the public streets. Mr. Clucas, a member of the Committee, said that they had been informed by their legal adviser that the Council had no power to compel such payment. Mr. Kneen, the legal gentleman referred to, said he had advised that the Legislature would not be likely to impose terms on the Company unless further concessions were asked for; but that the Council might have some claim in respect of the quality of gas supplied. The Company were bound by Act of Tynwald to supply better and cheaper light than could be supplied were oil used; and if they failed, their power to break up the streets failed. Some people would say that the light supplied was better than could be obtained from oil; but this was a matter for an expert to determine. He had therefore advised that the matter be left over for the present. The report was adopted.

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No. of Stove	B 3047	B 3048	B 3049
Width of Fire	8½ in.	10 in.	13 in.
PRICE . .	45s.	55s.	65s.

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The Detection of Water Leakage at Worcester.—On the motion of Alderman Allsopp, the Worcester City Council have given instructions for the purchase of twelve additional Deacon waste-water meters, at an estimated cost of £400. The Alderman stated that there were already ten of the meters in position; and so effective had been their action, that it was decided to recommend the Council to adopt the system all over the city, by fixing twelve additional meters. During the three past quarters 44 million gallons less water had been pumped than in the corresponding period of the preceding year. With other items, this saving was brought up to 53 million gallons, which represented £221; and, adding an estimate for the remaining quarter of the year, the saving would be nearly £300 per annum.

Water Consumption and Rates at Bilston.—Since the Bilston District Council have had the water supply in their possession, the domestic consumption has increased by 20 per cent.; and this has necessitated an extra amount of expenditure. Last year 370 million gallons of water were pumped; representing an average daily consumption of 842,000 gallons. The charges are lower than in Birmingham; and in connection with the undertaking, the Council have been put to considerable expense in law proceedings. In 1894, the financial result of the working was a deficiency of £492, which by 1896 had increased to £719. On these grounds, the Council last Thursday decided to increase the water-rate for domestic purposes from £6 13s. 4d. to £7 per cent., and to slightly raise the charges for water supplied for manufacturing purposes up to 70,000 gallons, beyond which quantity the existing rates are to be continued.

A Large Village Water Scheme for the Penrith District.—At a recent meeting of the Penrith Rural District Council, a report was presented by Mr. E. A. Sandford Fawcett, bearing upon the best means of supplying with water a number of villages in the district. He proposed to take the water at a level of from 1200 to 1250 feet above Ordnance datum; and he has prepared two schemes—one to cost £12,500, and the other £10,830. He advised the Council to adopt the former, which would involve a rate of 2¾d. in the pound; and he suggested that the Council should approach the Urban District Council with a view of ascertaining whether they would be willing to join them in carrying it out, as some provision had been made and the additional cost of enlarging the reservoirs and mains so as to supply 600,000 gallons per 24 hours at the high-level reservoir at Penrith would only amount, approximately, to £9000; making the cost of the scheme £21,500. This course was agreed to.

The Corporation of London and the Water Question.—The County Purposes Committee of the Corporation have issued an interesting report upon the question of the London Water Supply and the Royal Commission, whose sittings were resumed yesterday. The Committee, after pointing out that the citizens and ratepayers of the City living outside the City have interests identical with the rest of the water consumers, remark that under the special conditions of the City the financial bearings of the question assume exceptional importance. It is obvious, the report says, that as the City pays one-eighth of the rates of the whole Metropolis, it will have to find one-eighth of the purchase-money and pay one-eighth of the increase, if any, in the water charges. It is pointed out that seven years ago the value of the eight water undertakings was stated to be £33,440,000; while evidence had been given to the effect that the purchase of these undertakings at £30,000,000 would have the effect of increasing the present water-rate at least 30 per cent. The Committee declare that the Water Companies should not in the future be conducted merely as commercial undertakings, but should be carried on primarily in the interests of the consumers. It did not necessarily follow that because the purchase of all the undertakings would, or might, involve such an increase of charges as had been indicated, that the purchase of a particular undertaking by one authority might not be advantageous. One of the most important questions the Royal Commission will have to deal with will be the future operation of the Chamberlain's sinking-fund clause and the appropriation of moneys thereby accumulated, according as either purchase or control is eventually decided upon. From the notices the Chamberlain has already received, it appears that the Companies have already raised, or are raising, £2,210,000 subject to the operation of this clause; the whole amount to which it will eventually apply being £6,320,030 of debenture stock. The report states that it is probable the London County Council will make a proposition to the Commission on the subject.

The Procrastination of the Local Government Board.—The Chairman of the West Riding County Council (Alderman C. G. Milnes-Gaskell) on Wednesday delivered the address which it is usual to prepare for the last meeting of the triennial period for which the councillors are elected. In the course of it, he praised the work which had been accomplished by the Sanitary Committee, especially in regard to the question of plumbo-solvent moorland water; their action in this respect having been of great benefit to the 700,000 persons who drink moorland water in the West Riding. The case of the Horsforth water was, he said, a typical one. The Medical Officer reported to the District Council in 1893, and the two succeeding years, adversely to the character of the water supplied by the Company. He stated that the water was not filtered; and it proved that the Company employed a man who was virtually only an unskilled labourer to take charge of the valves at the water-works. The Directors declared that the water was excellent; while the unskilled labourer declared that the Directors knew that it was often unfiltered. In September, 1896, enteric fever broke out; and when it had gone on into October, the Council became alarmed. Their own Inspector made another report; and the West Riding Medical Officer was called in. On Oct. 19, Dr. Kaye made an inquiry, and reported to the Sanitary Committee. In November, the Local Government Board were asked to hold an inquiry. If it had been a case of a railway accident, when nothing could have been done to help the victims, the inquiry would, no doubt, have been held next day. But in this case it was not held until March of 1897; and the report of the Board's Inspector—fully corroborating all the conclusions of the Medical Officers—was not made until July. During all the period between November and July, this large population was urgently desiring advice. He could only congratulate Horsforth that the outbreak did not assume so serious a form as that at Maidstone or Kings's Lynn; for he gathered from the report that the water was drawn from land plentifully manured with all the nightsoil from Horsforth, and that the unskilled labourer in question filtered it or not entirely at his own pleasure.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
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CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected during the last four-and-a-half years, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

AMERICA.

TORONTO	One New Set.
OTTAWA	One New Set.
TORONTO	(Second Contract) Improving Four Double Superheater Settings.
LINDSAY	Re-modelling Plant.
MONTREAL	Two New Sets and other parts of Plant.
BELLEVILLE	One "Springer" Setting Re-modelled with M-W-P. Patents.
OTTAWA	(Second Contract) One New Set.
BRANTFORD	Additional Improvements to Existing Setting.
ST. CATHERINES	Additional Improvements to Existing Setting.
KINGSTON, PA.	One New Set and other Parts of Works, including New Purifiers and Gasholder.
PETERBOROUGH	One Set and Re-modelling Works.
WILKESBARRE, PA.	Two New Sets and other parts of Plant.
ST. CATHERINES	(Second Contract) One New Set.
BRANTFORD	(Second Contract) One New Gasholder.

ENGLAND.

	Daily Capacity. Cubic Feet.
BLACKBURN	1,250,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Company)	120,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR STREET WORKS BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000

The Bury Corporation and their Gas Manager.—For some weeks the Gas Committee of the Bury Town Council have been conducting an inquiry as to certain alleged irregularities in connection with the management of the gas-works; and, as the result of their investigations, the services of the Gas Manager (Mr. W. H. S. Gendall) were dispensed with on Thursday last. Naturally, the affair has given rise to a great deal of comment in the district, and many exaggerated reports have been put into circulation. The probabilities are that the whole truth will not be known until the next meeting of the Town Council, when an official statement will be presented on the subject.

Carlisle Gas and Water Supply.—At the meeting of the Carlisle City Council last Tuesday, the minutes presented by the Gas Committee showed that the Committee had requested the Town Clerk to make application to the Local Government Board for sanction to borrow £17,000, being the balance of £25,000 authorized under the Carlisle Provisional Order, 1893, to meet the expenditure on capital account since 1895 and to provide for future ordinary extensions of the gas-works. The Committee further considered the report of the Engineer (Mr. C. B. Newton) with reference to the proposed extensions at Boustead's Grassing, and had referred the subject to the Works Sub-Committee to consider and report thereon to the next meeting. The minutes were confirmed.

West Australia's Water Difficulty.—According to a report of inquiries made at the Agency-General for West Australia in London, it was stated officially that the Government propose to ensure Coolgardie a reliable supply of water from a source near Freemantle. It is to be completed in between two or three years. It will then, it is expected, be possible to supply the water in the Coolgardie district at 3s. 6d. per 1000 gallons, whereas now it costs as much as that for 100 gallons. The total working expenses of the scheme, inclusive of interest and a 3 per cent. sinking fund, are estimated at £320,000 per annum; and the Government reckon that it will be self-supporting.

The Stanton Iron-Works Company, Limited, near Nottingham, have secured a contract for upwards of 25,000 tons of 42-inch cast-iron pipes for the Birmingham Corporation Water-Works.

Owing to the large increase which has taken place in the business of Messrs. Richmond and Co., Limited, necessitating considerable expenditure on the foundry at Warrington and on the new works at Stratford (now completed), the Directors decided early last month to issue the remaining £5000 of 6 per cent. cumulative preference shares. After the claims of the ordinary shareholders had been satisfied, the balance of the new issue was applied for twelve times over.

GWYNNE & BEALE'S
PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 65,095, Holborn.

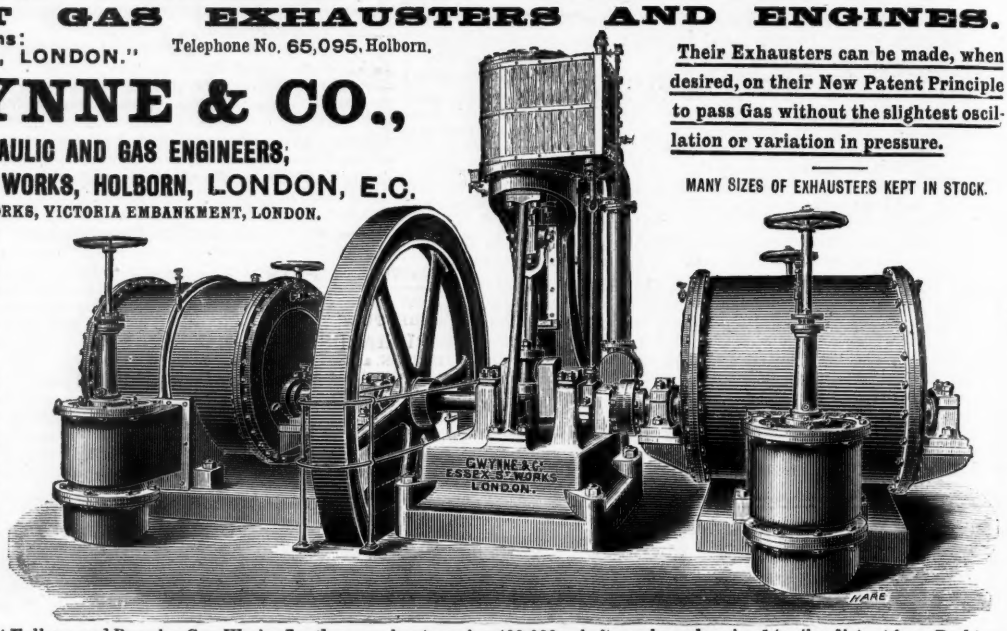
GWYNNE & CO.,
HYDRAULIC AND GAS ENGINEERS;
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 36,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.



Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
JOHN WM. O'NEILL, Managing Director, Palmerston Buildings, Old Broad Street, London, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to be addressed to Palmerston Buildings.

WINKELMANN'S "VOLCANIC" CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 300 British Gas-Works.
ANDREW STEPHENSON,
182, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.
Telegrams: "*Volcanism, London.*"

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE. Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

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First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
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JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see Jan. 4, p. 49.]

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
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SPECIALLY favourable terms for Cycles. First-Class Workmanship and Material guaranteed Art Catalogue post free.
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HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

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SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

IMPORTANT.

OLD Retorts made equal to new by repairing them with CROWTHER'S PATENT STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Can be used in Hot or Cold Retorts; and "A1." for Mouthpiece Joints. Satisfaction Guaranteed.
CROWTHER, Practical Retort Setter, Manor Street, HUDDERSFIELD.

WANTED, an Engagement by an ENGINEER experienced in the design and erection of Gas-Works and General Engineering on large Extensions to Works, or as AGENT to a Firm of Contractors.
Address C. E., 141, Walton Street, OXFORD.

AGENCIES FOR HOLLAND.

A YOUNG Dutchman, well introduced to many Managers of Gas-Works and leading Gas-Fitters, wishes to REPRESENT first-class English Firms in Holland.
Please address H. 153, care of H. PRAKKE, Bookseller, Nymegen, HOLLAND.

WANTED (home or abroad) a Situation as FOREMAN of Gas-Works, or MANAGER of small ones. A thorough practical knowledge of the manufacture in all its branches. Accustomed to Exhauster and Photometer, Main and Service laying, &c. Excellent Testimonials.
Address No. 2990, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-FITTER wanted by the Gas Com- pany, Aberdare, South Wales.
Applications, stating Age, Qualifications, and Wages, with *copies* of recent Testimonials, to be sent to the MANAGER.

GAS MANAGER (WORKING).

WANTED, a Man to take sole charge of Small Gas-Works on an Estate in Derbyshire. Wages, 25s.; Coal and House.
Apply to A. T. BULLER, Bath Road, SWINDON.

FOREMAN Stoker wanted. Must have had experience with Regenerator Furnaces, and be familiar with the routine work of a Retort-House. Wages 35s. per week.
Apply, by letter only, to the MANAGER, Gas-Works, ROCHDALE.

WANTED, a practical Working Gas MANAGER for Works in a town of 10,000 Population. Wages £2 2s. a week, with House, Light, and Fuel.
Applications, with three original Testimonials, to be sent to the undersigned on or before Monday, the 31st of January.
THOS. FALKNER ALLISON.
Louth.

WANTED, at once, two good Main LAYERS for laying Water-Mains; also a good ENGINE DRIVER, who thoroughly understands Gas and Petroleum Engines. None but competent Men need apply.
Applications, with Testimonials, to be sent to the MANAGER, Water and Gas Company, BEXHILL.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.
TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

SALE OF £11,701 "C" CAPITAL STOCK.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock, in Lots,
£11,701 OF "C" CAPITAL STOCK,
Ranking for a Standard Dividend of 7 per cent., subject to the Sliding Scale—the last Dividend on similar Stock having been at the rate of 9 per cent.
Particulars at the COMPANY'S OFFICES, in Willoughby Lane, TOTTENHAM; of Messrs. MERRIMAN, PIKE, and MERRIMAN, Solicitors, 25, AUSTIN FRIARS, E.C.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.
LOWESTOFT WATER AND GAS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock, in Lots,
1000 ADDITIONAL ORDINARY £10 SHARES,
in the above Company, ranking for a Maximum Dividend of 7 per cent.—the last Dividend on similar Shares having been at the rate of 5¼ per cent.
Particulars may be obtained of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF £5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.
£3900 FOUR PER CENT. PERPETUAL DEBENTURE STOCK OF THE ASCOT DISTRICT GAS COMPANY.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.
GUILDFORD GASLIGHT AND COKE COMPANY.

SALE OF £5000 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell by AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock, in Lots, £5000 of ORDINARY STOCK in the Guildford Gaslight and Coke Company, ranking for a Standard Dividend of 5 per cent. per annum—the last Dividend on similar Stock in the Company having been at this rate, free of Income-Tax.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

TAUNTON GASLIGHT AND COKE COMPANY. BRIGHTON AND HOVE GENERAL GAS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 25, at Two o'clock,
£850 "A" STOCK, 18 £5 SHARES, and £1020 NEW STOCK, in the Taunton Gaslight and Coke Company; and
£800 ORIGINAL STOCK in the Brighton and Hove General Gas Company.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.
GREAT YARMOUTH WATER-WORKS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Monday, Feb. 14, 1898, at Two o'clock in Lots,
£2500 OF FOUR PER CENT PERPETUAL DEBENTURE STOCK,
of the Great Yarmouth Water-Works Company, offering a thoroughly high-class Investment.
Particulars of the AUCTIONEER, as above.

By order of the Directors.
CRAYS GAS COMPANY.

£3500 ORDINARY FIVE PER CENT. STOCK, TO BE SOLD BY AUCTION BY

MR. ALFRED RICHARDS, at the Mart, E.C., on Monday, Feb. 14, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, as above.

By order of the Directors.
WHITCHURCH AND DISTRICT (HANTS) GAS COMPANY, LIMITED.

MR. ALFRED RICHARDS will Sell by AUCTION, at the Mart, E.C., on Monday, Feb. 14, at Two o'clock, in Lots,
150 £10 FULLY-PAID ORDINARY SHARES
in the above Undertaking.
Particulars may be obtained of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of Executors and other Owners.
GAS AND WATER STOCKS AND SHARES IN THE MAIDENHEAD GAS COMPANY, GORING AND STREATLEY GAS AND WATER COMPANY, HENFIELD GAS AND COKE COMPANY, LIMITED, AND PORTSEA ISLAND GAS COMPANY,
TO BE SOLD BY AUCTION BY

MR. ALFRED RICHARDS, at the Mart, E.C., on Monday, Feb. 14, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, as above.

WANTED, a Draughtsman, thoroughly accustomed to designing and detailing Gas Apparatus.
Apply, stating Age, Experience, and Salary required to No. 2985, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a young Man (about 20 or 21), with some experience in laying Services, fixing Meters, and the General Work of a Gas-Works. Wages, 24s. weekly. A permanent job, and increase of Wages, offered to a Man who proves competent.
Apply, by letter only, to the MANAGER, Gas-Works, DARTFORD.

WANTED, an experienced Main and SERVICE LAYER. One capable of Erection of all Gas-Works Plant. Permanent Engagement to a steady and competent Workman.
State (by letter) References and Wages expected to No. 2987, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, immediately, an experienced Man to inspect Services, read Meters, tap Water-Mains under pressure with Morris's Patent Tapping Tackle, lay Mains and Services, and do general Mechanical Work and Repairs of a Water-Works Company. Wages 20s. to 30s. a week. First-class References absolutely necessary.
Applications and References to be sent to Mr. A. HAROLD RUSTON, Secretary, Newmarket Water-Works Company, Limited, NEWMARKET.

CITY OF BRADFORD.

THE Gas and Electricity Supply Com- mittee invite applications for the position of ASSISTANT GAS ENGINEER, at a salary of £250 per annum.
Candidates must have had practical experience in Gas-Works Management, and must possess a good knowledge of Gas Engineering and Chemistry.
Applications, endorsed "Assistant Gas Engineer," and stating Age and Qualifications, with *copies* of not more than three recent Testimonials, to be addressed to me on or before Jan. 31 inst.
Canvassing will be considered a disqualification.
GEORGE MCGUIRE,
Town Clerk.
Town Hall, Bradford,
Jan. 11, 1898.

GOOLE URBAN DISTRICT COUNCIL.

THE above Council require the Services of a thoroughly competent MANAGER for their Gas and Water Department. He must have a practical knowledge of the Manufacture of Gas, be conversant with Water-Works and Machinery connected therewith, and be competent to advise the Council upon, and carry out, any improvement which may be required.
Salary £300 per annum.
Applications, stating when at liberty, accompanied by original Testimonials of recent date (not exceeding three), to be sent to me, marked on the outside "Application for Gas Manager," not later than the 28th of January inst.
By order of the Council,
GEORGE ENGLAND,
Clerk.
Goole, January, 1898.

STAFFORDSHIRE POTTERIES WATER-WORKS COMPANY.

THE Directors of the above Company are desirous of securing the services of a competent and qualified Gentleman to act as SECRETARY to the Company, who shall devote his whole time and attention to the duties of the Office.
Preference will be given to Candidates between 30 and 40 Years of age, and who have filled a similar position.
The Salary will commence at £300 per annum.
Applications, stating Age and previous Engagements, and accompanied by Three recent Testimonials, to be endorsed "Appointment of Secretary," and addressed to the Chairman, at the Company's Offices, Hanley, on or before the 27th inst.
Personal canvassing is not permitted.
By order,
G. D. HARRISON,
Engineer and Manager.
Albion Street, Hanley,
Jan. 14, 1898.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BIRMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

WANTED Carbon. State Price for 4-ton Lots, delivered at nearest Station.
Address No. 2960, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Second-hand Gasholder, in good order, 24 ft. by 10 ft., three Columns, Six Guide Rails, Valves, and Outlet and Inlet Pipes complete.
BATHGATE GASLIGHT COMPANY, BATHGATE, N.B.

GAS-PUMP for Sale, horizontal, one Steam Cylinder, 18-inch bore, and two Gas Cylinders, 17½-inch bore, all 24-inch Stroke, on massive Bed-Plate, with heavy Fly-Wheels. Very strong. First-Class Make. Not much used.
Apply, by letter, to No. 2878, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A 20,000 cubic feet per hour DEMPSTER RECIPROCATING GAS EXHAUSTER, with Connections, complete. In very good condition.
Address No. 2978, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

EXHAUSTER, in perfect order, 25,000 cubic feet per hour, with two Valves and Connections, £35.
GASHOLDER and IRON TANK, 9000 cubic feet capacity, nearly new, £165 f.o.r.
Address No. 2984, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A Modern Sulphate of AMMONIA STILL, built by Messrs. R. & J. Dempster, Manchester, 1893, with separate Liming Compartment. Capacity, with ordinary Liquor, 5000 to 6000 lbs. of Sulphate per day.
For further Particulars, apply to the BRYMBO STEEL COMPANY, LIMITED, near WREXHAM.

PURIFIERS FOR SALE.

THE Montrose Gaslight Company have FOR SALE four PURIFIERS, each 12 ft. by 8 ft. by 3 ft. deep, with four 8-inch and two 10-inch Four-Way Valves and Connections, three Tiers of Sieves in each Purifier, and Lifting Gear complete. All in good condition. Sides of Covers almost new.
For further Particulars, apply to the Manager, THOS. D. HALL.

LLANELLY GAS COMPANY.

TENDERS are invited for the supply and delivery at Llanelly Gas-Works of two 8-inch HORIZONTAL STEAM PUMPS, suitable for pumping Ammoniacal Liquor and Tar. Each Pump to be fitted with Reversing Gear.
Prices, Particulars, and date of Delivery to be addressed to A. R. CAWLEY, Ystrad Gas and Water Offices, Pentre R.S.O., GLAM.

CORPORATION OF LEICESTER.

RETORTS AND FIRE-BRICKS.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive TENDERS for the supply and delivery of RETORTS and FIRE-BRICKS.
Specification, Quantities, and Form of Tender can be obtained from the Engineer.
Tenders, addressed to Alderman Lennard, Chairman, and endorsed "Tender for Retorts, &c.," to be delivered at these Offices not later than Eleven o'clock a.m., on Wednesday, Jan. 26, 1898.
The Committee do not bind themselves to accept the lowest or any tender.
ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.
Offices: Millstone Lane,
Leicester, Jan. 11, 1898.

BARTON GAS COMPANY.

THE Directors of this Company invite TENDERS for the construction of a PUDDLED BRICK TANK, 64 feet diameter by about 20 feet deep inside.
Also for a GASHOLDER, 60 feet in diameter by 20 feet deep.
Drawings and Specifications may be seen at the Company's Works, copies of which may be obtained on deposit of One Guinea for each set (returnable if a *bond-fide* Tender be made), from the Engineer, Mr. G. Helps, Hinckley, or from the undersigned.
Tenders, to be endorsed "Gasholder" or "Tank," as the case may be, and addressed to the Secretary of the Barton Gas Company, Barton-on-Humber, to be delivered on or before Four p.m. on the 10th of February next.
The Directors do not bind themselves to accept the lowest or any tender.
W. H. GOY,
Secretary.
Barton-on-Humber,
Jan. 11, 1898.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas. Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
CHESTERFIELD.

Price, Bound in Cloth, 5s. 6d., Post Free.
— FIFTEENTH YEAR —
THE
COMPLETE REPORTS
OF
PROCEEDINGS
OF THE
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OF
GAS ENGINEERS & MANAGERS
OF THE UNITED KINGDOM
FOR 1897.

The Fourteen previous Volumes are still on Sale.

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Telegrams: "Silkstone Castleford."

THE SILKSTONE & HAIGH MOOR COLLIERIES, LTD.
ALLERTON BYWATER, CASTLEFORD.

Steam, Manufacturing, & Gas Coals & Cannel.
Analysis, Contracts, Trial Waggons, and Quotations for Large and Small Orders. Inquiries Solicited.

GAS PURIFICATION BY
HYDRATED OXIDE.

THIS Material is of full Strength, and Exceptional Activity. It is specially prepared to minimize Back-Pressure; and will be supplied on Hire, or Sold, on the most favourable Terms.
SPENT OXIDES containing Blue, also CRUDE FERRO-CYANIDE PRODUCTS, either PURCHASED or EXCHANGED for FRESH OXIDE.
MANCHESTER OXIDE COMPANY, LTD.,
CANAL ST., MILES PLATTING, MANCHESTER.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON NEWCASTLE."

THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

ALEXANDER CAMERON,
GAS AND CANNEL COAL MERCHANT,
48, WEST REGENT STREET,
GLASGOW.

THE
"ETNA" FIRE & HEAT RESISTING CEMENT,
For RETORT PURPOSES, is INVALUABLE.
Sole Manufacturers:
FRED YERITY & SON,
CALL LANE, LEEDS.
Scores of Testimonials received. Write for Particulars.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
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FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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CANNEL COAL MERCHANT,

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Prices and Analysis of all the Scotch Cannels on Application.

HOLMSIDE

GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England, and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR

PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE & SOUTH MOOR OFFICES,

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EVESON FOR CANNEL

TELEGRAMS:
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E. ASQUITH & CO.,

Hydraulic Engineers,

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Fit up Plants for

Pressing Anthracene, Naphthalene, &c.

Competent Men sent out to erect same. Estimates given.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.

8 Lombard Street,
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W. RICHARDSON, Fitter.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . . 10,500 Cub. Ft.
Illuminating Power . . 16·9 Candles.
Coke (of good quality) . . 67·5 per Cent.
Sulphur . . . . . 0·58 „
Ash . . . . . 2·78 „

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub.
Illuminating Power . . . . . 17·8 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

COAL OWNERS, NEWCASTLE-ON-TYNE;

OR

E. FOSTER & CO.,

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SUSPENDING ARC LANTERN.

INCANDESCENT GAS LIGHTING

The disastrous effects of SHOCKS and VIBRATIONS may now be done away with by the use of

CLAY'S PATENT SHOCK-PROOF FITTINGS,

which are the next best thing to UNBREAKABLE MANTLES.

The Illustrations show two of our arrangements; but we are able to cope with all conceivable conditions or requirements.

WRITE FOR OUR ILLUSTRATED CATALOGUE WITH FURTHER INFORMATION.

WARNING: As we hold the Master Patents covering the COILING OF SUPPLY-PIPES to obtain a resilient bearing to neutralize the damaging effect of Shock or Vibration on the Mantles of Incandescent Burners, we shall not hesitate to immediately INSTITUTE PROCEEDINGS AGAINST ANYONE INFRINGING OUR RIGHTS.

"C" BURNER SUSPENDED WITH BYE-PASS OVERHEAD.

CLAY & WALMSLEY

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Telegrams: "CLAYS, BOLTON." See Illustrated Advt. in "Journal," Nov. 30, 1897, p. 1155.

G. & J. HAIGH,

Raven's Lodge Fire-Brick Works, DEWSBURY.

FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for **GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.**

WHITE GLAZED AND SALT GLAZED BRICKS, BUFF FACING BRICKS, &c.

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SOLE AGENTS FOR
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PATENT REGENERATIVE FURNACES
FOR
ENGLAND, WALES & ABROAD.
RETORT BENCHES ERECTED COMPLETE WITH OR WITHOUT SPECIAL FURNACES.
RESULTS GUARANTEED.

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RETORT SETTERS.
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Designs and Estimates on Application.

GASEOUS FIRING A SPECIALTY.

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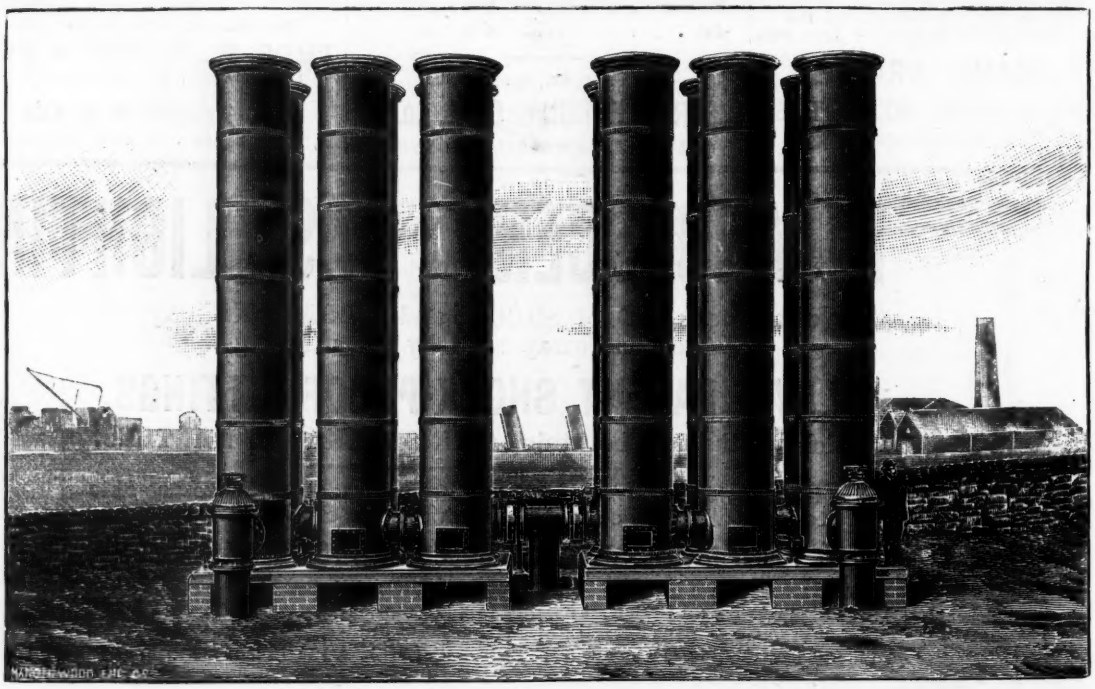
CATALOGUES SENT POST FREE ON APPLICATION.



Telegrams: "HOLMES, HUDDERSFIELD;" "IGNITOR, LONDON."

A Set of Twelve Condensers, 4 ft. diameter by 28 ft. high. *From a Photograph.*

Makers of Retort Ironwork, Patent Scrubber-Washers, Purifiers, Gasholders of all sizes, and Gas Plant and Structural Ironwork of every description.

WHITESTONE IRON-WORKS, HUDDERSFIELD

WOMBWELL MAIN COMPANY, LD.,

BARNSLEY.

BEST GAS COAL.

ANALYSIS: 11,390 feet of 17-Candle Gas. Value in Sperm per ton, 686 lbs.

By R. O. PATERSON, C.E.

APPLY

WOMBWELL MAIN COMPANY, LIMITED, BARNSLEY.

Telegrams: "MAIN, WOMBWELL."

STOCKPORT GASHOLDER

ON PEASE'S STEEL CABLE SYSTEM.

Great Saving in Cost, and Absolutely Reliable in Working.

TIME SAVED IN ERECTION.

WEIGHT SAVED.

FREIGHTS REDUCED.

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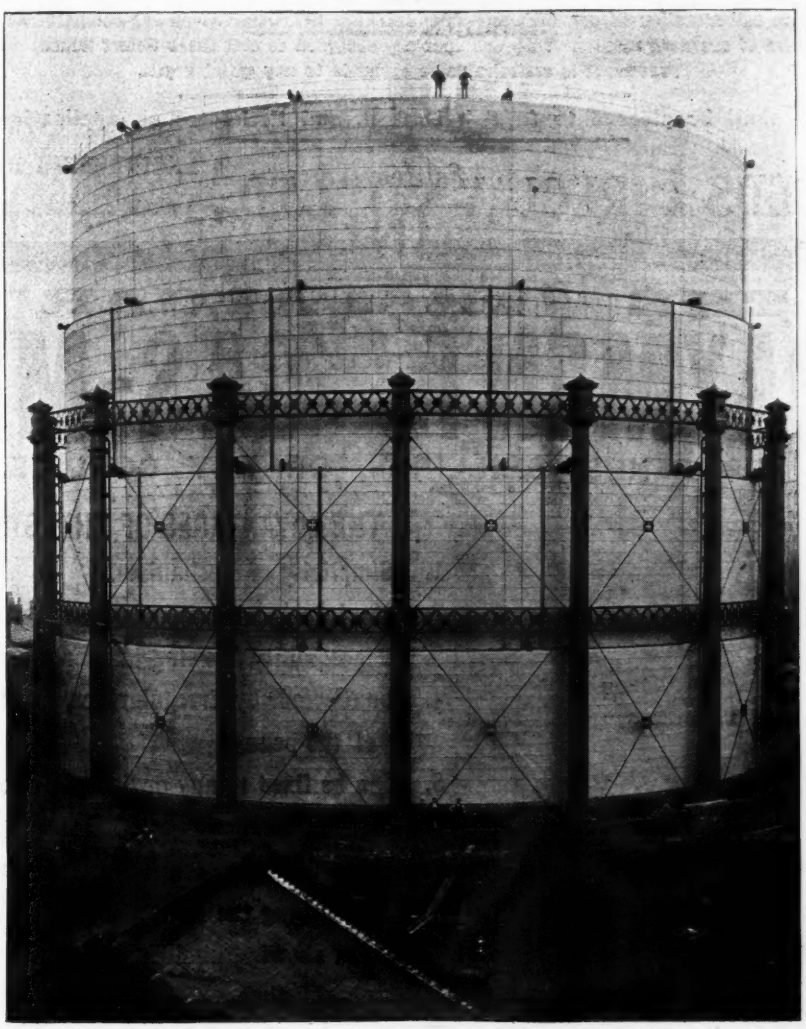

THESE HOLDERS ARE CERTIFIED BY USERS TO BE STEADIER UNDER WIND PRESSURE THAN HOLDERS WITH COLUMNS.

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TWO LIFTS ADDED WITH PATENT CABLE GUIDING (PEASE'S SYSTEM).

Enlarged under Patent 41,189, 1897, with Water in the Tank, for STOCKPORT CORPORATION.

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STOCKTON-ON-TEES.

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COAL and COKE Breakers, Elevators, AND Conveyors.

RETORTS, Bricks, Blocks, Tiles, &c.

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EVERY DESCRIPTION OF

RETORT SETTINGS AND IRONWORK.

WE GUARANTEE RESULTS.

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We desire to call attention to our SHALLOW REGENERATIVE SETTINGS, which are comparatively inexpensive to erect, and productive of excellent results. They are specially designed to suit those Retort Houses where for various reasons it is undesirable to excavate to any great depth.

We shall be pleased to furnish Designs and Estimates on application.

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PREPAYMENT GAS-METER

FOR PENCE, SHILLINGS, OR ANY COINAGE.

THE ADVANTAGES OF THIS SYSTEM ARE:

1. Simplicity of Mechanism.
2. Absolute Accuracy.
3. Impossibility of being tampered with.
4. Unaffected by irregularities in shape or thickness of the penny.
5. Can be fixed to any ordinary Wet or Dry Meter.
6. Extra large Money-Box.
7. Price Changer can be altered without otherwise disturbing the Meter.
8. Index showing number of Pennies in the mechanism at any time.
9. Rejection of Half-Pennies certain.

GUARANTEED FOR FIVE YEARS.

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Telegraphic Address: "Gasometer, London." Manufacturers of Wet and Dry Gas-Meters. Offices and Works: 62, GLENGALL ROAD, S.E. Telephone No. 59 Peckham.

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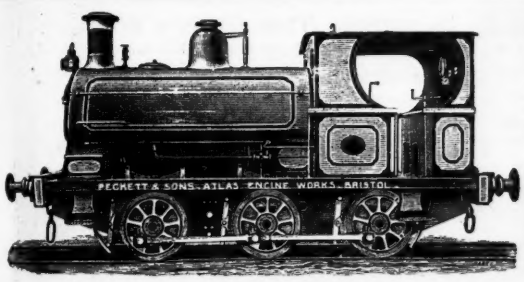
Every Description of ORDINARY GAS-METERS.

THE AUTOMATIC GAS-METER (1895) CORPORATION, LTD.

ROCK METER WORKS,
TORTWORTH STREET, STRANGEWAYS, MANCHESTER.
London Address: 59, QUEEN VICTORIA STREET, E.C.



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LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for Immediate Delivery.

Photographs, Specifications, and Prices on Application.

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COLUMNLESS HOLDERS.

Notwithstanding the antagonistic influence of firms who are not permitted to construct Holders on **GADD & MASON'S PATENT SPIRAL GUIDE SYSTEM,** their adoption grows larger every year. Intelligent Gas Engineers appreciate the **GREATER SAFETY** of these Holders, and the very great **SAVING IN COST** of from **20** to **30 PER CENT.** No first-class Engineer should now think of paying for so much Metal in the shape of Columns, and the Labour of Erection.

Some time ago the "JOURNAL OF GAS LIGHTING" referred to

"THE KNELL OF GASHOLDER GUIDE-FRAMING,"

which speaks volumes.

In order to meet the ever-increasing demand, we have granted **Licenses for the construction of our patent System of Holders to a select few of the leading Gasholder Makers,** from whom Estimates and Particulars can be obtained.

Gas Engineers are enjoined to avoid Firms who talk twaddle about Columns giving greater strength, merely in order to obtain an Extra Price for the weight of Metal therein and the Labour in Erection. Prices of Materials and Labour are constantly advancing—a sufficient reason why all Engineers should place their orders with Firms who can give them our Holders, and so save considerably in first cost, as well as Repairs, besides getting a **STRONGER, SAFER,** and a **BETTER SYSTEM.**

The first Gadd and Mason Holder was erected some Nine Years ago at Northwich. It has withstood the most violent Storms (one of which brought down the chimney stack); and we believe up to now has not cost a single fraction for Repairs.

THE PATENT GASHOLDER SYNDICATE, 504, Stockport Rd., MANCHESTER.

BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
Established 1860.

OSLER,
BIRMINGHAM.

MANUFACTURERS OF GASELIERS IN GLASS AND METAL.

THE THAMES BANK IRON CO.
UPPER GROUND STREET, LONDON, S.E.,
SUPPLY FROM STOCK
CAST-IRON RETORTS,
AND ALL KINDS OF GAS-WORKS APPARATUS.
SOCKET-PIPES FOR GAS OR WATER PURPOSES.
FLANGE PIPES FOR STEAM.
Sole Manufacturers of **LYON'S "PATENT" GAS-MAIN SYPHONS.**
AGENTS FOR
ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,
SIR WILLIAM ARROL & CO., Limited,
GLASGOW.
[See Illustrated Advertisement, Jan. 4, p. 11.]

The Climax of Regenerative Gas Lighting!!

THE
"VERTMARCHE"
A 280-Candle Power PLAIN IRON LAMP,
CLASS A— 55/-
LIGHT for LIGHT
less than half the price of any other Regenerative Lamp.
Manufactured in England.
HENRY GREENE & SONS,
153 & 155, CANNON STREET, LONDON BRIDGE, E.C.
PARTICULARS AND PRICES FREE. AGENTS WANTED.

WILLIAM INGHAM & SONS,
Incorporated with the Leeds Fire-Clay Company, Ltd.,
WORTLEY FIRE-CLAY WORKS, Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—
1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT
MACHINE-MADE GAS-RETORTS.

PATENT TWISTED TAPER
RYMERS & TAPS.

These **Patent Twisted Taper Rymers and Taps** are the best ever made for Gas and Water Service Connections. A true Hole and a correct Thread can be assured. They are easy to work, and will last much longer than straight grooved Taps and Rymers.

THOUSANDS ARE IN DAILY USE.

Also SCREWING-MACHINES, STOCKS and DIES (with Patent Twisted Dies), PIPE-TONGS, and other TOOLS.

Apply for Prices and Particulars to
JOHN RUSCOE,
ALBION WORKS, HYDE, near MANCHESTER.

MAKERS OF
CLAYTON, SON & Co LTD LEEDS.
ALL KINDS GAS PLANT
12,100,000 CUB FT CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS
OUR SPECIALITY
IT IS 300 FT DIAS. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
HIGH CLASS BOILERS &c
ANTI-FREEZERS RETORT LIDS

GIRDERS, ROOFS, & ALL KINDS OF STRUCTURAL IRONWORK.

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MANUFACTURERS OF
BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.
MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.
ESTABLISHED 1836.

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INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.
WORTLEY, LEEDS.

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LIVERPOOL:
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LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

FIRE-BRICKS, FIRE-CLAY, & FURNACE CEMENT.

THE
FURNACE FIRE-BRICK CO., LTD.
(Late JAMES WHITE & CO.)
Works: LONGCLIFFE, near WIRKSWORTH, DERBYSHIRE.
MANUFACTURERS OF
HIGH-CLASS FIRE-BRICKS, acknowledged to be the best obtainable for
GAS, IRON, & CHEMICAL FURNACES.

For Analysis and Prices, address—
JAMES WHITE & CO.,
WIDNES, LANCASHIRE.

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Manufacturer of
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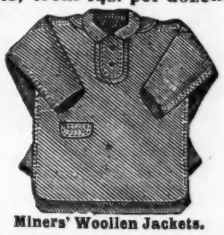
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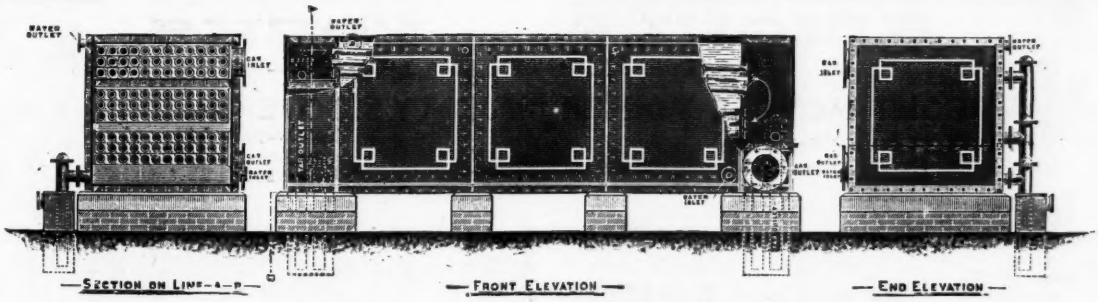

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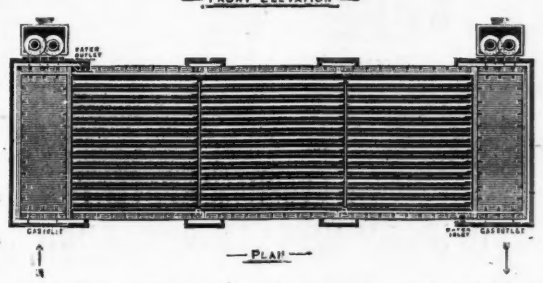
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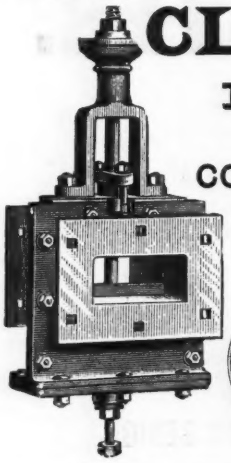

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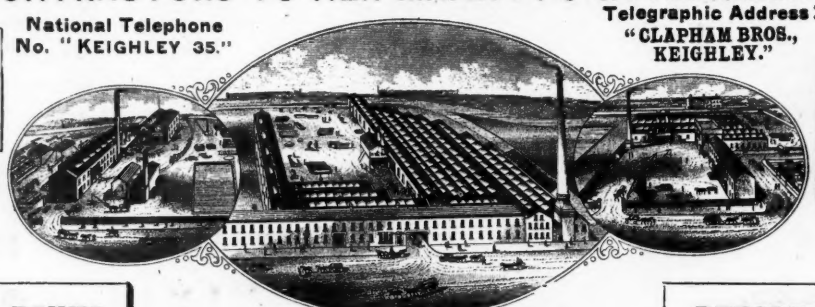

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